Dell™ PowerEdge™ C1100 Systems

Hardware Owner's Manual

Regulatory Model CS24-TY

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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Regulatory Model CS24-TY

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1

About Your System

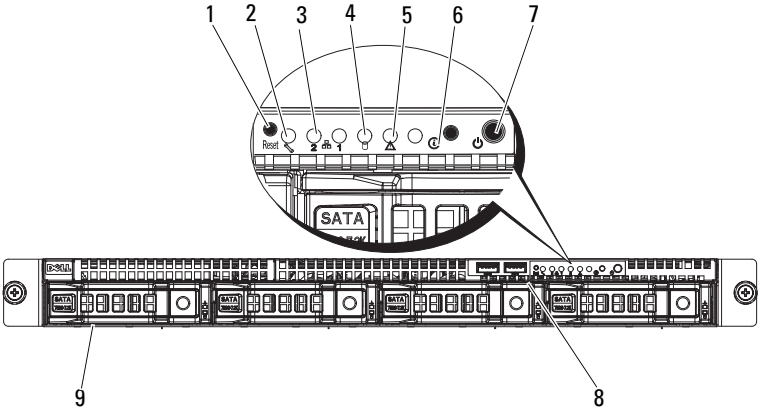
Accessing System Features During Startup

The following keystrokes provide access to system features during startup.

Keystroke	Description
<F2>	Enters the System Setup program. See "Start Menu" on page 33.
<F11>	Enters the BIOS Boot Manager. See "System Setup Options at Boot" on page 34.
<F12>	Starts Preboot eXecution Environment (PXE) boot.
<Ctrl><C>	Enters the SAS Configuration Utility. For more information, see the SAS adapter documentation.
<Ctrl><R>	Enters the RAID configuration utility. For more information, see the documentation for your SAS RAID card.
<Ctrl><S>	Enters the utility to configure NIC settings for PXE boot. For more information, see the documentation for your integrated NIC.

Front-Panel Features and Indicators

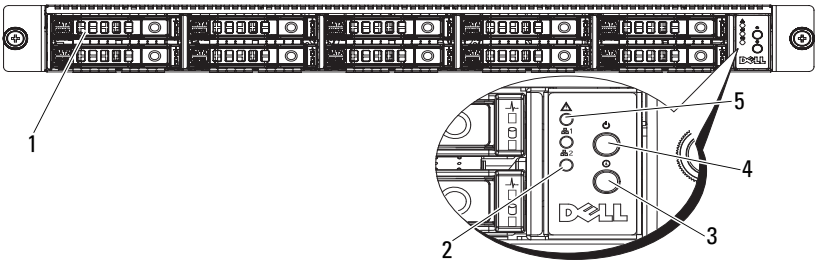
Figure 1-1. Front-Panel Features—3.5-Inch Hard-Drive System



Item	Indicator, Button, or Connector	Icon	Description
1	Reset button		Restarts the system while the system is powered on.
2	Service LED		Lights when the BMC port is on and blinks when there is traffic on the BMC port.
3	Ethernet connectors 1 and 2		Lights green when a connection is made to the NIC port, blinks when there is traffic on the NIC port.
4	Hard drive activity LED		Lights when the hard drives are active.
5	Fault LED		Displays status/errors and is controlled by BMC.

Item	Indicator, Button, or Connector	Icon	Description
6	System identification indicator/button		The system identification button can be used to locate a particular system and system board within a rack. When the button is pushed, the blue system status indicators on the front and the back blink until the button is pushed again.
7	Power-on indicator/power button		The power-on indicator lights when the system power is on. The power button controls the DC power supply output to the system. **NOTE:** When powering on the system, the video monitor can take from several seconds to over 2 minutes to display an image, depending on the amount of memory installed in the system. **NOTE:** On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off. **NOTE:** To force an ungraceful shutdown, press and hold the power button for 5 seconds.
8	USB connectors (2)		Connects USB devices to the system. The ports are USB 2.0-compliant.
9	Hard drives		Up to four hot-swappable 3.5-inch hard drives.

Figure 1-2. Front-Panel Features—2.5-Inch Hard-Drive Systems

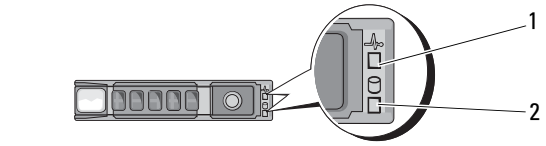


Item	Indicator, Button, or Connector	Icon	Description
1	Hard drives		Up to ten hot-swappable 2.5-inch hard drives.
2	Ethernet connectors 1 and 2		Lights green when a connection is made to the NIC port, blinks when there is traffic on the NIC port.
3	System identification indicator/button		The system identification button can be used to locate a particular system and system board within a rack. When the button is pushed, the blue system status indicators on the front and the back blink until the button is pushed again.

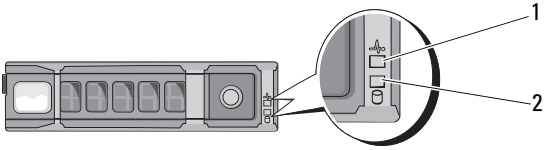
Item	Indicator, Button, or Connector	Icon	Description
4	Power-on indicator/power button		The power-on indicator lights when the system power is on. The power button controls the DC power supply output to the system. **NOTE:** When powering on the system, the video monitor can take from several seconds to over 2 minutes to display an image, depending on the amount of memory installed in the system. **NOTE:** On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off. **NOTE:** To force an ungraceful shutdown, press and hold the power button for 5 seconds.
5	Fault LED		Displays status/errors and is controlled by BMC.

Hard-Drive Indicator Patterns

Figure 1-3. Hard-Drive Indicators



2.5-inch hard-drive carrier



3.5-inch hard-drive carrier

1 hard-drive activity indicator (green)

2 hard-drive status indicator (green and amber)

Table 1-1. Hard Drive Indicators—On-Board SATA Ports

Drive-Activity Indicator/Drive-Status Indicator	Condition
Off/Off	No drive
Steady green/Off	No access
Steady green/Steady green	Drive online
Steady green/Blinks green	Drive is present or in idle stage

Table 1-2. Hard Drive Indicators—SAS/SATA Add-on Cards

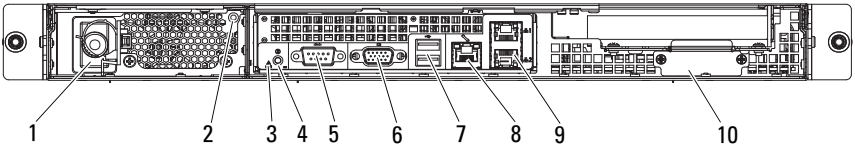
Drive-Activity Indicator/Drive-Status Indicator	Condition
Off/Off	No drive
Steady green/Off	No access
Steady green/Steady green	Drive online

Table 1-2. Hard Drive Indicators—SAS/SATA Add-on Cards *(continued)*

Drive-Activity Indicator/Drive-Status Indicator	Condition
Steady green/Blinks green	Drive is present or in idle stage
Steady amber/Off	Drive failed
Steady amber/Steady green	Drive rebuilding

Back-Panel Features and Indicators

Figure 1-4. Back-Panel Features

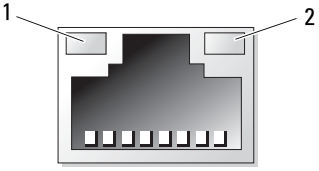


Item	Indicator, Button, or Connector	Icon	Description
1	Power supply		650 W
2	Power LED		Lights green when the power supply is functioning properly.
3	Fault LED	⚠	Displays status/errors and is controlled by BMC.
4	System identification indicator		Both the systems management software and the identification buttons located on the front can cause the indicator to flash blue to identify a particular system and system board. Lights amber when the system needs attention due to a problem.
5	Serial connector		Connects a serial device to the system.
6	Video connector		Connects a VGA display to the system.

Item	Indicator, Button, or Connector	Icon	Description
7	USB connectors (2)		Connects USB devices to the system. The ports are USB 2.0-compliant.
8	KVM over IP Port		Dedicated management port.
9	Ethernet connectors (2)		Embedded 10/100/1000 NIC connector.
10	Mezzanine-card cover		Remove this cover before installing mezzanine card.

NIC Indicator Codes

Figure 1-5. NIC Indicators



1 link indicator 2 activity indicator

Table 1-3. NIC Speed Indicator Codes

NIC Speed Indicator	Condition
Steady amber	Link at 1 Gbps
Blinks amber	Identify port with 1 Gbps connection
Steady green	Link at 100 Mbps
Blinks green	Identify port with 10 Mbps or 100 Mbps connection
Green off	Link at 10 Mbps

Table 1-4. NIC Indicator Codes—BMC

NIC Indicator	Condition
Steady green	Link LAN/No access
Blinks green	Accessing LAN
Green off	Idle

Table 1-5. NIC Speed Indicator Codes (KVM Over IP Port)

NIC Speed Indicator	Condition
Steady green	Link at 100 Mbps
Green off	Link at 10 Mbps

Power and System Board Indicator Codes

The LEDs on the system front and back panel display error codes during system startup. Systems with 2.5-inch or 3.5-inch hard drives share the same LEDs on the front and back panel. Table 1-6 lists the status associated with the error codes.

Table 1-6. Power and System Board Indicator Codes

Power-On Indicator	Condition
Steady green, Amber off	Power On (S0/S1)
Green off, Blinks amber	BMC critical condition event in power off mode (S4/S5)
Green, Blinks amber	BMC critical condition event in power off mode (S0/S1)

Table 1-7. System Identification Indicators

System Identification Indicator	Condition
Steady blue	IPMI using chassis identify command on or ID button press identification on.
Blinks blue blinking	Only IPMI using chassis identify command blink on.
Blue off	IPMI using chassis identify command off or ID button press identification off.

Table 1-8. Power Indicator Codes

Power Indicator	Condition
Steady green	Power supply is on (AC OK/DC OK) or in standby mode (90–264 VAC)
Steady yellow	Power supply faulty (UVP/OVP/OCP/SCP/OTP/Fan Fault)
Yellow off	Power supply is off or AC input voltage is out of normal operating range (90 VAC–264 VAC)

Table 1-9. Fault Indicator Codes

Fault Indicator	Condition
Amber blinking	System failure or Non-critical failure: non-critical fan, voltage, temperature state, or CPU thermal trip.
Amber off	No system failure or Off

POST Error Codes

Code	Log in BMC	Error Message	Corrective Action
0000	Yes	Timer Error	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0003	Yes	CMOS Battery Low	See "Troubleshooting the System Battery" on page 100.
0004	Yes	CMOS Settings Wrong	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0005	Yes	CMOS Checksum Bad	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
000B	Yes	CMOS memory size Wrong	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
000C	Yes	RAM R/W test failed	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
000E	Yes	A: Driver Error	See "Troubleshooting a Hard Drive" on page 105.
000F	Yes	B: Driver Error	See "Troubleshooting a Hard Drive" on page 105.
0012	Yes	CMOS Date/Time Not Set	Remove AC power to the system for 10 seconds and restart the system. See "Troubleshooting the System Battery" on page 100. If the problem persists, see "Getting Help" on page 119.

Code	Log in BMC	Error Message	Corrective Action
0040	Yes	Refresh timer test failed	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0041	Yes	Display memory test failed	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0042	Yes	CMOS Display Type Wrong	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0044	Yes	DMA Controller Error	See "Troubleshooting System Memory" on page 103. If the problem persists, see "Getting Help" on page 119.
0045	Yes	DMA-1 Error	See "Troubleshooting System Memory" on page 103. If the problem persists, see "Getting Help" on page 119.
0046	Yes	DMA-2 Error	See "Troubleshooting System Memory" on page 103. If the problem persists, see "Getting Help" on page 119.
0047	Yes	Unknown BIOS error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0048	Yes	Password check failed	Reset password. See "Jumper Settings" on page 112. If the problem persists, see "Getting Help" on page 119.

Code	Log in BMC	Error Message	Corrective Action
0049	Yes	Unknown BIOS error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
004A	Yes	Unknown BIOS error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
004B	Yes	Unknown BIOS error.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
005E	Yes	Password check failed	Reset password. See "Jumper Settings" on page 112. If the problem persists, see "Getting Help" on page 119.
005D	Yes	S.M.A.R.T. Command Failed S.M.A.R.T. Status BAD, Backup and Replace	See "Getting Help" on page 119.
0060	Yes	Primary Master Hard Disk Error	See "Troubleshooting a Hard Drive" on page 105.
0061	Yes	Primary Salve Hard Disk Error	See "Troubleshooting a Hard Drive" on page 105.
0062	Yes	Secondary Master Hard Disk Error	See "Troubleshooting a Hard Drive" on page 105.
0063	Yes	Secondary Salve Hard Disk Error	See "Troubleshooting a Hard Drive" on page 105.
0080	Yes	Primary Master Drive - ATAPI Incompatible	See "Troubleshooting a Hard Drive" on page 105.
0081	Yes	Primary Salve Drive - ATAPI Incompatible	See "Troubleshooting a Hard Drive" on page 105.

Code	Log in BMC	Error Message	Corrective Action
0082	Yes	Secondary Master Drive - ATAPI Incompatible	See "Troubleshooting a Hard Drive" on page 105.
0083	Yes	Secondary Slave Drive - ATAPI Incompatible	See "Troubleshooting a Hard Drive" on page 105.
0101	Yes	Warning! This system board does not support the power requirements of the installed processor. The processor will be run at a reduced frequency, which will impact system performance.	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's Getting Started Guide. See "Troubleshooting Processors" on page 108.
0102	Yes	Error! The CPU Core to Bus ratio or VID configuration has failed! Please enter BIOS Setup and re-config it.	The message is displayed on the screen, an error is logged to the SEL, and user input is required to continue. The user can take immediate corrective action or choose to continue booting.
0120	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0121	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.

Code	Log in BMC	Error Message	Corrective Action
0122	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0123	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0124	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0125	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0126	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0127	Yes	Thermal Failure detected by PROCHOT#.	Ensure that the processor heat sinks are properly installed. See "Troubleshooting Processors" on page 108 and "Troubleshooting System Cooling Problems" on page 102.
0150	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.

Code	Log in BMC	Error Message	Corrective Action
0151	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0152	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0153	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0154	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0155	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0156	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0157	Yes	Processor failed BIST	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0160	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.

Code	Log in BMC	Error Message	Corrective Action
0161	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0162	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0163	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0164	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0165	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0166	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0167	Yes	Processor missing microcode	A BIOS update is required. If the problem persists, see "Getting Help" on page 119.
0180	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0181	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.

Code	Log in BMC	Error Message	Corrective Action
0182	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0183	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0184	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0185	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0186	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0187	Yes	BIOS does not support current stepping	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0194	Yes	CPUID, Processor family are different	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.

Code	Log in BMC	Error Message	Corrective Action
0196	Yes	CPUID, Processor Model are different	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0193	Yes	CPUID, Processor stepping are different	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0192	Yes	L2 cache size mismatch	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
0197	Yes	Processor speeds mismatched	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0198	Yes	Processor Mismatch	Ensure that your processors match and conform to the type described in the processor technical specifications outlined in your system's *Getting Started Guide*.
0400	Yes	AHCI Port0 HDD Error	See "Troubleshooting a Hard Drive" on page 105.
0401	Yes	AHCI Port1 HDD Error	See "Troubleshooting a Hard Drive" on page 105.
0402	Yes	AHCI Port2 HDD Error	See "Troubleshooting a Hard Drive" on page 105.
0403	Yes	AHCI Port3 HDD Error	See "Troubleshooting a Hard Drive" on page 105.
0404	Yes	AHCI Port4 HDD Error	See "Troubleshooting a Hard Drive" on page 105.

Code	Log in BMC	Error Message	Corrective Action
0405	Yes	AHCI Port5 HDD Error	See "Troubleshooting a Hard Drive" on page 105.
5120	Yes	CMOS cleared by jumper	Reset password. See "Jumper Settings" on page 112. If the problem persists, see "Getting Help" on page 119.
5121	Yes	Password cleared by jumper	Reset password. See "Jumper Settings" on page 112. If the problem persists, see "Getting Help" on page 119.
8101	Yes	Warning! USB Host Controller not found at the specified address!!!	See "Troubleshooting a USB Device" on page 96. If the problem persists, see "Getting Help" on page 119.
8102	Yes	Error! USB device failed to initialize!!!	See "Troubleshooting a USB Device" on page 96. If the problem persists, see "Getting Help" on page 119.
8103	Yes	Warning! Unsupported UBS device found and disabled!!!	See "Troubleshooting a USB Device" on page 96. If the problem persists, see "Getting Help" on page 119.
8104	Yes	Warning! Port 60h/64h emulation is not supported by this USB Host Controller!!!	See "Troubleshooting a USB Device" on page 96. If the problem persists, see "Getting Help" on page 119.
8105	Yes	Warning! EHCI controller disabled. It requires 64-bit data support in the BIOS.	See "Troubleshooting a USB Device" on page 96. If the problem persists, see "Getting Help" on page 119.

Code	Log in BMC	Error Message	Corrective Action
8301	Yes	Not enough space in Runtime area! SMBIOS data will not be available.	See "Troubleshooting System Memory" on page 103. If the problem persists, see "Getting Help" on page 119.
8302	Yes	Not enough space in Runtime area! SMBIOS data will not be available.	See "Troubleshooting System Memory" on page 103. If the problem persists, see "Getting Help" on page 119.
8601	Yes	Error: BMC Not Responding	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.
8701	Yes	Insufficient Runtime space for MPS data. System may operate in PCI or Non-MPS mode.	Remove AC power to the system for 10 seconds and restart the system. If the problem persists, see "Getting Help" on page 119.

Beep Codes

The following table describes the beep codes that are used in boot block:

Number of Beeps	Description
1	No media
2	Boot-block bios file absent
3	Insert next diskette in A:
4	Flash program successful
5	Read file error
7	No flash present
8	Floppy controller error
10	Flash erase error
11	Flash program error

Number of Beeps	Description
12	Wrong bios file size
13	ROM image mismatch
14 (1 long beep after 4 beeps)	BIOS recovery by jumper

Post Beep Codes

Number of Beeps	Description
1	Refresh timer error
3	Base 64 K memory failure
6	8042 – gate A20 failure
8	Display memory read/write failure
2	Exception interrupt shutdown
3	No main memory

Other Information You May Need

WARNING: See the safety and regulatory information that shipped with your system. Warranty information may be included within this document or as a separate document.

The *Getting Started Guide* provides an overview of rack installation, system features, setting up your system, and technical specifications.

NOTE: Always check for updates on **support.dell.com/manuals** and read the updates first because they often supersede information in other documents.

2

Using the System Setup Program

Start Menu

The system employs the latest AMI Core BIOS, which is stored in Flash memory. The Flash memory supports the Plug and Play specification, and contains a BIOS Setup program, the Power-On Self-Test (POST) routine, and the PCI auto-configuration utility.

This system board supports system BIOS shadowing, enabling the BIOS to execute from 64-bit onboard write-protected DRAM.

Configure items such as:

- Hard drives, diskette drives, and peripherals
- Password protection from unauthorized use
- Power management features

This Setup utility should be executed under the following conditions:

- When changing the system configuration
- When a configuration error is detected by the system and you are prompted to make changes to the Setup utility
- When redefining the communication ports to prevent any conflicts
- When changing the password or making other changes to the security setup

NOTE: Only items in brackets [ ] can be modified. Items that are not in brackets are display only.

System Setup Options at Boot

You can initiate Setup by pressing <F2> during POST.

Console Redirection

The console redirection allows a remote user to diagnose and fix problems on a system, which has not successfully booted the operating system. The centerpiece of the console redirection is the BIOS Console. The BIOS Console is a Flash ROM-resident utility that redirects input and output over a serial or modem connection.

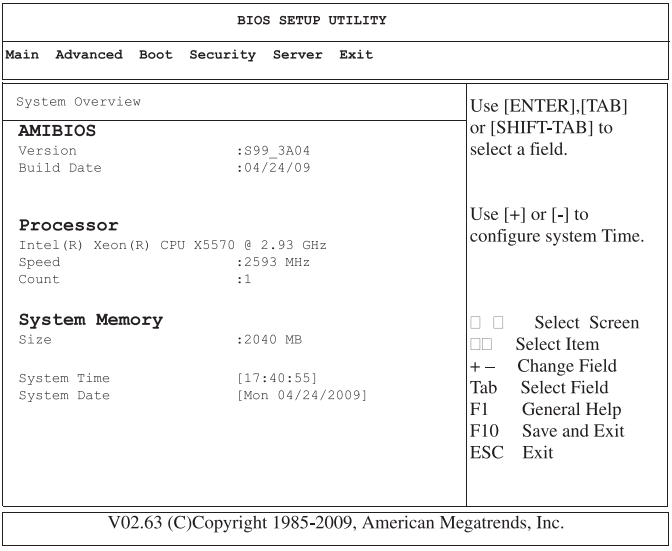
The BIOS supports console redirection to a serial port. If serial port based headless system support is provided by the system, the system must provide support for redirection of all BIOS driven console I/O to the serial port. The driver for the serial console must be capable of supporting the functionality documented in the ANSI Terminal Definition.

Main Menu

The main menu displays information about your system board and BIOS.

Main Screen

Figure 2-1. System Setup Program Main Screen



NOTE: The options for the System Setup program change based on the system configuration.

NOTE: The System Setup program defaults are listed under their respective options in the following sections, where applicable.

AMIBIOS Settings

Option	Description
Version	Displays the BIOS version. Check this version number when updating BIOS from the manufacturer.
Build Date	Displays the date the BIOS was created.
ID	Displays the BIOS ID.

Processor Settings

Option	Description
Type	Displays the type of processor installed on the system board.
Speed	Displays the maximum speed of the processor.
Count	Displays the number of installed processors.

System Memory Settings

Option	Description
Size	Displays how much memory (DRAM) is installed on the system board.
System Time	Scroll to adjust the time.
System Date	Scroll to adjust the date.

Advanced Menu

This option displays a table of items that defines advanced information about your system.

WARNING: Making incorrect settings to items on these pages may cause the system to malfunction. Unless you have the experience in adjusting these items, it is recommended that you leave these settings at the default values. If making settings to items on these pages causes your system to malfunction or prevents the system from booting, open BIOS and choose "Load Optimal Defaults" in the Exit menu to boot up normally.

Processor Configuration

Option	Description
Hardware Prefetcher (**Enabled** default)	Enables you to control the **Hardware Prefetcher** feature.
Adjacent Cache Line Prefetch (**Enabled** default)	Enables you in order to control the **Adjacent Cache Line Prefetch** feature.

Option	Description
Max CPUID Value Limit (**Disabled** default)	Enable this option to limit the maximum CPUID input value to 03h when queried, even if the processor supports a higher CPUID input value. **NOTE:** This feature is disabled for Windows® XP Intel® processors from Pentium™ Pro onwards, except Intel Pentium 4, that have a maximum CPUID input value of only 02h or 03h.
Intel(R) Virtualization Tech (**Enabled** default)	Enable this option when the processor supports VT. A full reset is needed to change its state.
Execute-Disable Bit Capability (**Enabled** default)	When **Disabled**, forces the XD feature flag to always return 0.
Active Processor Cores (**All** default)	Sets the number of cores to enable in each processor package.
Intel(R) HT Technology (**Enabled** default)	When **Disabled**, allows only one thread per enabled core.
Intel(R) SpeedStep(TM) tech (**Enabled for OS** default)	Allows the clock speed of the processor to be dynamically changed by software.
Intel(R) TurboMode tech (**Enabled** default)	Allows processor cores to run faster than marked frequency in specific condition.
Intel(R) C-STATE tech (**Enabled** default)	CState: CPU idle is set to C1/C2/C3/C6/C7.
C3 State (**Disabled** default)	Displays the size of CPU L2.
C6 State (**Enabled** default)	Displays the size of CPU L3.
NUMA Support (**Disabled** default)	When enabled, executes software for NUMA aware OS. When disabled, it allows better memory access performance for non-NUMA OS.

Memory Configuration

Option	Description
Current Memory Frequency (**1066 MHz** default)	Displays the current memory frequency
Memory Turbo Mode (**Disabled** default)	Displays the memory turbo mode.
Memory Frequency (**Auto** default)	Forces a DDR3 frequency slower than the common tck detected via SPD.
Memory Mode (**Independent** default)	Selects the memory mode.
Throttling - Closed Loop (**Enabled** default)	Enables BIOS to program Closed Loop throttling for memory components.
Throttling - Open Loop (**Enabled** default)	Enables BIOS to program Open Loop throttling for memory components.

IDE Configuration

Option	Description
SATA#1 Configuration (**Enhanced** default)	Configures the SATA#1.
Configure SATA as (**IDE** default)	Configures the SATA. • IDE • AHCI • RAID
Hard Disk Write Protect (**Disabled** default)	Enables or disables device write protection. This is effective only if the device is accessed through BIOS.
IDE Detect Time Out (Sec)	Selects the time out value for detecting ATA/ATAPI device(s).

Super IO Configuration

Option	Description
Serial Port1 Address (**3F8/IRQ4** default)	Assigns the I/O address and IRQ for the first onboard serial port.
Serial Port2 Address (**3F8/IRQ4** default)	Assigns the I/O address and IRQ for the second onboard serial port.

USB Configuration

Option	Description
USB Devices Enabled	Displays USB devices currently detected.
Legacy USB Support (**Auto** default)	Enables support for legacy USB devices. Select **Auto** to disable legacy support if no USB devices are connected.
USB 2.0 Controller	Configures the USB 2.0 controller in HiSpeed (480 Mbps) or FullSpeed (12 Mbps).
USB Mass Storage Reset Delay (**20 Sec** default)	Displays the number of seconds that the POST waits for the USB mass storage device after the start unit command is issued.
Device#	USB device model name.
Emulation Type (**Auto** default)	If the type is set to **Auto**, USB devices which are less than 530 MB are emulated as floppies and the others are emulated as hard drives. Forced FDD option can be used to force a formatted hard drive to boot as FDD (e.g. ZIP drive).

PCI Configuration

Option	Description
NIC1 KAWELA (**Enable with PXE** default)	Enables or disables onboard 82576 NIC1 PXE option ROM.
NIC2 KAWELA (**Enable with PXE** default)	Enables or disables onboard 82576 NIC2 PXE option ROM.

Option	Description
PCI-E SLOT Option Rom (**Enabled** default)	Enables or disables add-on card option rom.
PCI-E Connector Option Rom (**Enabled** default)	Enables or disables board to board PCI-E connector option rom.
NIC1 Mac Address	Displays the NIC1 MAC address.
NIC2 Mac Address	Displays the NIC2 MAC address.
Current QPI Frequency	Enables or disables the QPI frequency.
QPI Link Speed (**Full-Speed** default)	Enables or disables the QPI link speed.
QPI Frequency (**Auto** default)	Enables or disables the QPI frequency.
QPI L0s and L1 (**Enabled** default)	Enables or disables the QPI L0s and L1.
Crystal Beach / DMA (**Disabled** default)	Enables or disables the Crystal Beach / DMA configuration.
Intel VT-d (**Disabled** default)	Enables or disables the Intel® Virtualization Technology for Directed I/O.
SR-IOV Supported (**Disabled** default)	Enables or disables SR-IOV support.
Active State Power Management (**Disabled** default)	Enables the individual serial Links in a PCI Express fabric to be incrementally reduced as a Link becomes less active.
ME Support (**Enabled** default)	Enables the Management Engine (ME) to allow for the use of Intel AMT.
Port 2 Width	Select the Port 2 Width. Settings: X2 or X2/X4.

Boot Menu

Option	Description
Boot Settings Configuration	Configures the settings during system boots.
Boot Device Priority	Specifies the boot device priority.
Hard Disk Drives	Specifies the boot device priority sequence from the available hard drives.
CD/DVD Drives	Specifies the boot device priority sequence from the available CD/DVD drives.
Network Device	Specifies the network device.

Boot Settings Configuration

Option	Description
Quick Boot (**Enabled** default)	Enables you to allow BIOS to skip certain tests during the POST, which decreases boot up time.
Quiet Boot (**Disabled** default)	Enable or disable quiet boot. Disabled: displays normal POST messages. Enabled: displays OEM logo instead of POST messages.
AddOn ROM Display Mode (**Force BIOS** default)	Enables you to display mode controlled by BIOS or addon ROM.
Bootup Num-Lock (**On** default)	Enables you to set the state of the keyboard keypad on boot. On: The keypad functions as a keypad. Off: The keypad functions as auxiliary cursor movement keys.
Wait For 'F1' If Error (**Disabled** default)	Enables the system to prompt you to press F1 if an error occurs. This enables you to view the error.
Hit 'F2' Message Display (**Enabled** default)	Enables the system to prompt you to press 'F2' to enter the BIOS Setup Utility.
Force PXE First (**Enabled** default)	Enables forced network boot (PXE).

Server Menu

NOTE: Delay Time, Minimum time, and Maximum time are only shown in SETUP screen when AC Power Recovery Delay is set to User define. The selection of Restore on AC Power Loss setup to Power-on or Last State takes 60 seconds for running BMC initialization after AC Power on.

Option	Description
Status of BMC	Displays the status of BMC.
IPMI Specification Version	Displays the BMC supported IPMI version.
BMC Firmware Version	Displays the firmware version of BMC.
Set BMC LAN Configuration	Input for Set LAN configuration command.
Remote Access Configuration	Configures remote access.
Restore on AC Power Loss (**Power Off** default)	Restores the AC power setting. The options are Power Off, Power On and Last State.
Power Staggering AC Recovery (**User Defined** default)	Selects the time of system power on after BMC initiates. Immediate: powers on directly after BMC initiates. Random: randomly selects time to power on. User define: allows the user to select the time.
Power On Delay	Displays the AC power recovery delay time.
View BMC System Event Log	Displays all events in the BMC Event Log.
Clear BMC System Event Log	Clears all events in BMC System Event Log.
Event Logging (**Enabled** default)	Enables or disables BIOS to record Event Logging.
ECC Event Logging (**Enabled** default)	Enables or disables ECC Event Logging.
PCI Error Logging (**Enabled** default)	Enable or disable PCI Error Logging.

Option	Description
QPI Error Logging (**Enabled** default)	Enable or disable IOH QPI 0/1 error.
IOH Internal Error Logging (**Enabled** default)	Enable or disable IOH Internal error logging.
NMI on Error (**Fatal** default)	Enable to set the state of NMI on Error: • Fatal: Fatal error issue NMI. • Uncorrectable: Fatal and Uncorrectable errors issue NMI. • Correctable: Issues NMI on all errors.

BMC LAN Configuration

Option	Description
Channel Number	Displays channel number of BMC.
Channel Number Status (**01** default)	Displays channel number status of BMC.
BMC LAN Port Configuration (**Shared-NIC** default)	Select the BMC LAN Port Configuration type.
DHCP Enabled (**Disabled** default)	Enables or disables the BMC get the LAN IP from a DHCP server.
IP Address	Enter an IP address in decimal in the form of XXX.XXX.XXX.XXX (XXX less than 256 and in decimal only).
Subnet Mask	Enter a Subnet Mask in decimal in the form of XXX.XXX.XXX.XXX (XXX less than 256 and in decimal only).
Gateway Address	Enter Gateway Address in decimal in the form of XXX.XXX.XXX.XXX (XXX less than 256 and in decimal only).
Current MAC Address in BMC	Displays the MAC address of BMC.

Remote Access Configuration

Option	Description
Remote Access (**Enabled** default)	Selects remote access type.
Serial Port Number (**COM1** default)	Selects serial port for console redirection.
Current SOL Baud Rate	Displays the current SOL Baud Rate.
Serial Port Mode (**115200 8,n,1** default)	Selects serial port settings. The default value may change if SOL baud rate is fixed by customer request.
Flow Control (**None** default)	Selects flow control for console redirection.
Redirection After BIOS POST (**Enabled** default)	Selects the settings for the redirection. • Disabled: turns off the redirection after POST. • Enabled: redirection is always active.
Terminal Type (**ANSI** default)	Selects the target terminal type.

NOTE: When **Flow Control** is set to **Software**, the Hyper Terminal on remote side is discontinued by pressing <Ctrl><S>. But the <Ctrl><S> is also the **Setup Key Stroke** for setting onboard NIC PXE Option ROM Configuration. Therefore, we suggest users change <Ctrl><S> to <Ctrl><B> in PXE OPROM Configuration in order to avoid that the Hyper Terminal on remote side is discontinued when pressing <Ctrl><S>.

Security Menu

Option	Description
Supervisor Password	Displays whether the supervisor password is installed or not.
User Password	Displays whether the user password is installed or not.
Change Supervisor Password/ Change User Password	Use this option to install, change or clear the password. If you select these items and press **Enter**, a dialog box appears and then you can enter a password. You can enter no more than six letters or numbers. Press **Enter** after you have typed in the password. A second dialog box asks you to retype the password for confirmation. Press **Enter** after you have retyped it correctly. The password is required at boot time, or when the user enters the Setup Utility.

Exit Menu

Option	Description
Save Changes and Exit	Select to save any changes that you have made in the Setup utility and exit the Setup utility.
Discard Changes and Exit	Select to discard any changes that you have made in the Setup utility and exit the Setup utility.
Discard Changes	Select to discard any changes you have made without leaving the setup utility.
Load Optimal Defaults	Select to install optimal settings for all the items in the Setup utility.

3

Installing System Components

Safety Instructions

WARNING: Working on systems that are still connected to a power supply can be extremely dangerous.

CAUTION: System components and electronic circuit boards can be damaged by discharge of static electricity.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

To avoid injury to yourself or damage to your system, follow these guidelines:

- Always disconnect the system from the power outlet whenever you are working inside the system case.
- If possible, wear a grounded wrist strap when you are working inside the system case. Alternatively, discharge any static electricity by touching the bare metal chassis of the system case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Do not flex or stress the circuit board.
- Leave all components inside the static-proof packaging until they are ready for installation.

Recommended Tools

- Phillips screwdriver
- Flat-tipped screwdriver

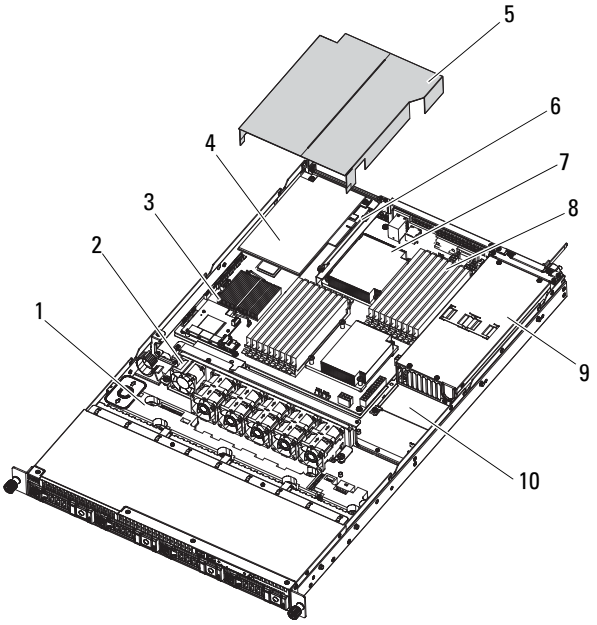
Inside the System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

CAUTION: This system must be operated with the system cover installed to ensure proper cooling.

NOTE: The illustration in this section shows a system with 3.5-inch hard drives.

Figure 3-1. Inside the System



1	SAS backplane	2	system cooling fans (6)
3	mezzanine card	4	storage controller card
5	cooling shroud	6	expansion-card riser
7	heat sink/processors (2)	8	memory modules (18)
9	power supply bay(s)	10	power distribution board

Hard Drives

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CAUTION: Use only hard drives that have been tested and approved for use with the SAS/SATA backplane.

CAUTION: When you remove or install the hard drive, take note of the drive carrier orientation before sliding it out. The carrier does not fit back into the bay if inserted incorrectly. Make sure that the hard drive is connected to the hard drive connector on the backplane

CAUTION: When installing a hard-drive carrier, ensure that the adjacent drives are fully installed. Inserting a hard-drive carrier and attempting to lock its handle next to a partially installed carrier can damage the partially installed carrier's shield spring and make it unusable.

CAUTION: To prevent data loss, ensure that your operating system supports hot-swap drive installation. See the documentation supplied with the operating system.

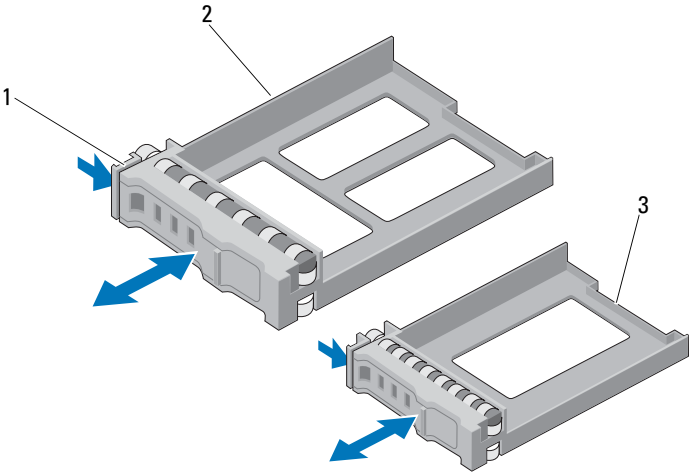
Your system supports 3.5-inch or 2.5-inch (SAS or SATA) hard drives. The installation and removal procedures for the 3.5-inch hard drive and 2.5-inch hard drive are similar. The following is an example using the replacement procedure of 3.5-inch hard drive.

Removing a Hard-Drive Blank

CAUTION: To maintain proper system cooling, all empty hard-drive bays must have-drive blanks installed.

Press the release button and slide the hard-drive blank out of the hard drive bay. See Figure 3-2.

Figure 3-2. Removing or Installing a Hard-Drive Blank



1	release lever	2	3.5-inch hard-drive blank
3	2.5-inch hard-drive blank		

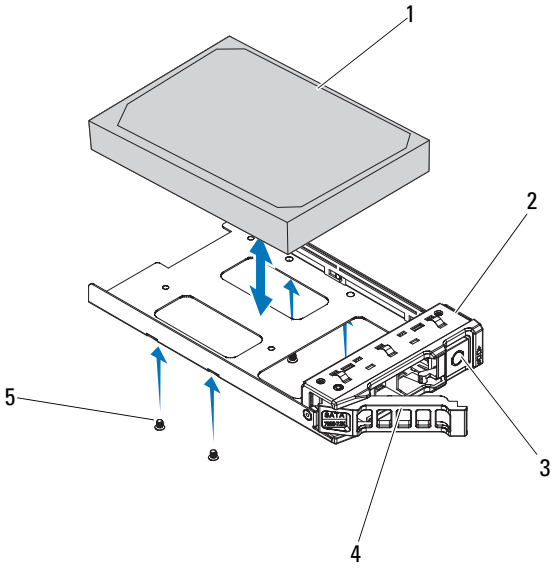
Installing a Hard-Drive Blank

Align the hard-drive blank with the drive bay and insert the blank into the hard-drive bay until the release lever clicks into place. See Figure 3-2.

Removing a Hard Drive From a Hard-Drive Carrier

1. Turn over the hard drive and remove the four screws from the slide rails on the hard-drive carrier. See Figure 3-3.
2. Lift the hard drive out of the hard-drive carrier.

Figure 3-3. Removing and Installing a Hard Drive From a Hard-Drive Carrier



1	hard drive	2	hard-drive carrier
3	release button	4	release lever
5	screws (4)		

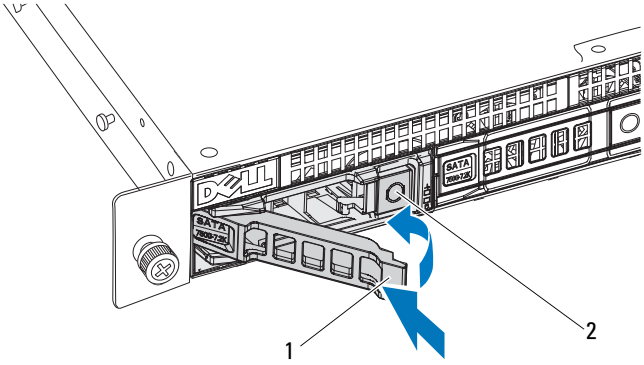
Installing a Hard Drive Into a Hard-Drive Carrier

1. Insert the hard drive into the hard-drive carrier with the connector end of the drive at the back. See Figure 3-3.
2. Align the holes on the hard drive with the holes on the hard-drive carrier.
3. Attach the four screws to secure the hard drive to the hard-drive carrier.

Removing a Hard-Drive Carrier

1. Press the button on the front of the hard-drive carrier to open the release lever.
2. Using the release lever, slide the hard-drive carrier out of the hard-drive bay. See Figure 3-4.
3. If you are not installing another hard-drive carrier, insert a hard-drive blank in the vacated drive bay. See "Installing a Hard-Drive Blank" on page 50.

Figure 3-4. Removing and Installing the Hard-Drive Carrier



1 hard-drive carrier handle 2 release button

Installing a Hard-Drive Carrier

1. Press the button on the front of the hard-drive carrier.
2. With the release lever on the hard-drive carrier open, slide the hard-drive carrier into the hard-drive bay until the carrier contacts the backplane.
3. Close the release lever to lock the hard-drive carrier in place. See Figure 3-4.

Opening and Closing the System

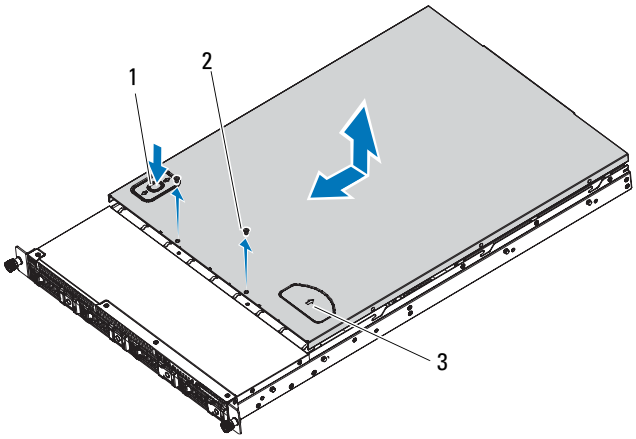
WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Opening the System

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Remove the two securing screws on the top of the system. See Figure 3-5.
3. Press down the locking button.
4. Grasp the cover on both the sides with your palm on the traction pad, slide out and lift the cover away from the system.

Figure 3-5. Opening and Closing the System



1 locking button
2 screws (2)
3 traction pad

Closing the System

1. Place the cover on the chassis and offset it slightly toward the back of the system, so that the hooks on the sides of the cover fit over the corresponding slots on the sides of the chassis.
2. Slide the cover toward the front of the chassis till the holes on the cover are aligned with the holes on the chassis.
3. Secure the cover with the two securing screws. See Figure 3-5.

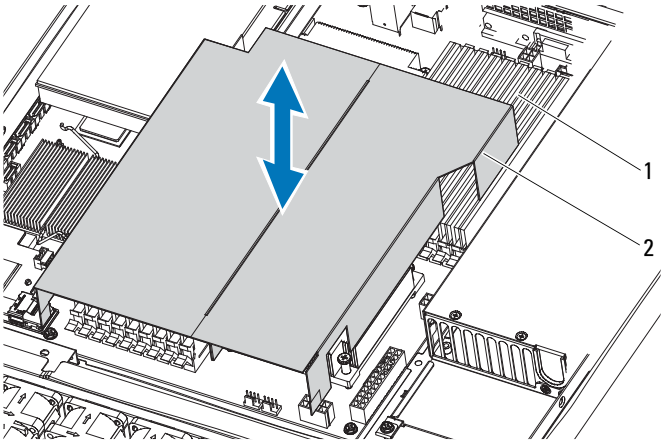
Cooling Shroud

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Cooling Shroud

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Lift the cooling shroud out of the system board assembly. See Figure 3-6.

Figure 3-6. Removing and Installing the Cooling Shroud



1 memory module 2 cooling shroud

Installing the Cooling Shroud

1. Align the cooling shroud around the sides of the heat sink and along the memory slots and press it into the system. See Figure 3-6.
2. Close the system. See "Closing the System" on page 54.
3. Reconnect the system and peripherals to their electrical outlets and turn on the system.

Heat Sinks

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Heat Sink

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Remove the expansion-card riser if applicable. See "Removing the Expansion-Card Riser" on page 66.

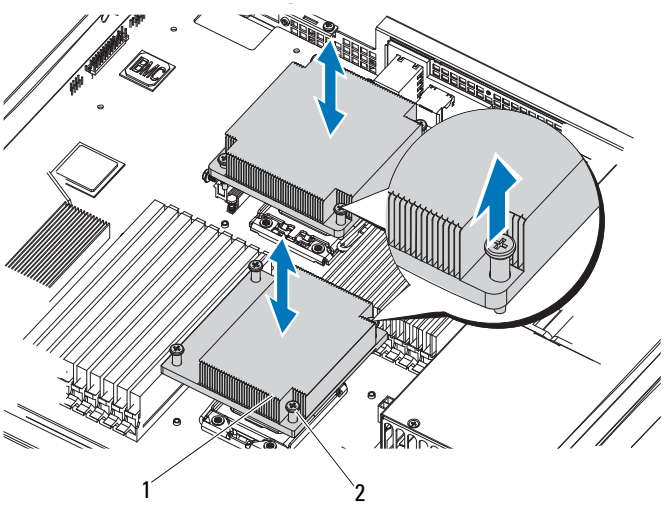
WARNING: The heat sink is hot to touch for some time after the system has been powered down. Allow the heat sink to cool before handling it.

CAUTION: Never remove the heat sink from a processor unless you intend to remove the processor. The heat sink is necessary to maintain proper thermal conditions.

5. Using a #2 Phillips screwdriver, loosen one of the heat-sink retention screws. See Figure 3-7.

   Wait 30 seconds for the heat sink to loosen from the processor.
6. Remove the other three heat-sink retention screws.
7. Gently lift the heat sink off of the processor and set the heat sink aside with thermal grease side facing up.

Figure 3-7. Removing and Installing the Heat Sink



1 heat sink 2 screws (4 each)

Installing the Heat Sink

CAUTION: The heat sinks for CPU0 and CPU1 are different and are labelled accordingly. They must be installed in the correct location to prevent the system from overheating.

1. Using a clean lint-free cloth, remove the thermal grease from the heat sink.
2. Apply new thermal grease evenly to the center of the top of the new processor.
3. Remove the protective cover from the underside of the heat sink.

   NOTE: Using excess thermal grease can cause grease to contact the processor shield, which can cause contamination of the processor socket.
4. Place the heat sink(s) on top of the processor(s) and tighten the four captive screws.
5. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.

6 If applicable, replace the expansion-card riser. See "Installing the Expansion-Card Riser" on page 67.

7 Close the system. See "Closing the System" on page 54.

8 Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Processor

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Processor

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Open the system. See "Opening the System" on page 53.

3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.

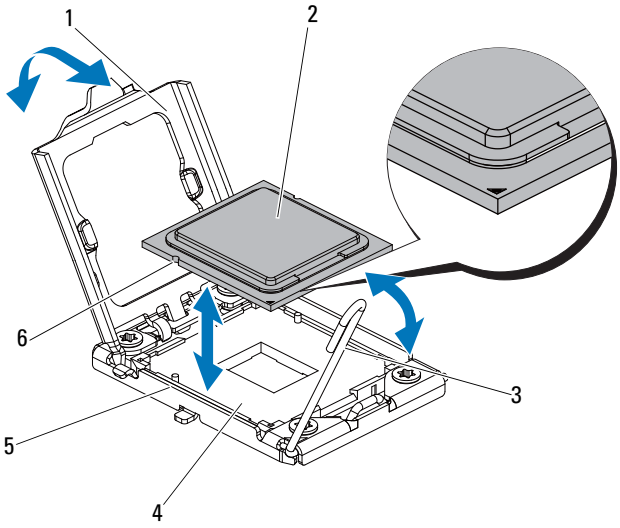
4 Remove the heat sink. See "Removing the Heat Sink" on page 56.

CAUTION: The processor is held in its socket under strong pressure. Be aware that the release lever can spring up suddenly if not firmly grasped.

5 Position your thumb firmly over the processor socket-release lever and release the lever from the locked position. Rotate the lever 90 degrees upward until the processor is released from the socket. See Figure 3-8.

6 Rotate the processor shield upward and out of the way.

Figure 3-8. Removing and Installing the Processor



1	processor shield	2	processor
3	socket-release lever	4	ZIF socket
5	socket keys (2)	6	notch in processor (2)

7 Lift the processor out of the socket and leave the socket-release lever up so that the socket is ready for the new processor.

CAUTION: Be careful not to bend any of the pins on the ZIF socket when removing the processor. Bending the pins can permanently damage the system board.

Installing the Processor

NOTE: When installing only one processor, the processor must be installed in the CPU0 socket (for the socket location, see "Jumpers and Connectors" on page 111).

NOTE: Your system uses an LGA 1366 socket, which is designed for trouble free insertion of the CPU. After placing the CPU into the socket, press the lever down and lock in place. If you notice any resistance when inserting the CPU, ensure that it is aligned correctly

1. If you are upgrading your processors, prior to upgrading your system, download and install the latest system BIOS version from **support.dell.com**. Follow the instructions included in the file download to install the update on your system.
2. Pull the locking lever of the processor socket out and up.
3. Unpack the processor if it has not been used previously.

   If the processor has already been used, remove any thermal grease from the top of the processor using a lint-free cloth.
4. Align the processor with the socket keys on the ZIF socket. See Figure 3-8.

CAUTION: Positioning the processor incorrectly can permanently damage the system board or the processor. Be careful not to bend the pins in the ZIF socket.

5. With the release lever on the processor socket in the open position, align the processor with the socket keys and set the processor lightly in the socket. See Figure 3-8.

CAUTION: Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.

6. Close the processor shield.
7. Rotate the socket release lever down until it snaps into place.
8. Using a clean lint-free cloth, remove the thermal grease from the heat sink.
9. Open the grease packet included with your processor kit and apply thermal grease evenly to the center of the top of the new processor.

CAUTION: Using excess thermal grease can cause grease to contact the processor shield, which can cause contamination of the processor socket.

10. Install the heat sink. See "Installing the Heat Sink" on page 57.
11. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
12. Close the system. See "Closing the System" on page 54.
13. Reconnect the system and peripherals to their electrical outlets, and turn on the system.
14. Press <F2> to enter the System Setup program, and check that the processor information matches the new system configuration. See "System Setup Options at Boot" on page 34.

System Memory

Your system supports DDR3 registered DIMMs (RDIMMs). Single and dual-rank DIMMs can be 1067 or 1333 MHz, and quad-rank DIMMs can be 1067 MHz.

The system contains 18 memory sockets split into two sets of nine sockets, one set for each processor. Each nine-socket set is organized into three channels of three memory sockets per channel.

The maximum memory that is supported on your system varies according to the types and sizes of memory modules being used:

- Single-rank, dual-rank, and quad-rank RDIMMs of sizes 1 GB, 2 GB, 4 GB, and 8 GB are supported for a total of up to 144 GB.
- Quad-rank RDIMMs (two per channel) are supported for a total of up to 96 GB.

General Memory Module Installation Guidelines

To ensure optimal performance of your system, observe the following general guidelines when configuring your system memory.

NOTE: Memory configurations that fail to observe these guidelines can prevent your system from starting and producing any video output.

- Except for memory channels that are unused, all populated memory channels must have identical configurations.
- The memory configuration for each processor must be identical.
- Memory modules of different sizes can be mixed in A1–A4 or B1–B4 (for example, 2 GB and 4 GB), but all populated channels must have identical configurations.
- For optimizer mode, memory modules are installed in the numeric order of the sockets beginning with A1 or B1.
- For memory mirroring or advanced ECC mode, the two channels furthest from the processor are unused and memory modules are installed beginning with channel A1 or B1 and proceeding with channel A2 or B2.
- Advanced ECC mode requires memory modules that use x4 or x8 DRAM device widths.

- The memory speed of each channel depends on the memory configuration:
  - For single- or dual-rank memory modules:
    - One memory module per channel supports up to 1333 MHz.
    - Two memory modules per channel supports up to 1067 MHz.
  - For quad-rank memory modules:
    - One memory module per channel supports up to 1067 MHz.
    - Two memory modules per channel are limited to 800 MHz, regardless of memory module speed.
- If quad-rank memory modules are mixed with single- or dual-rank modules, the quad-rank modules must be installed in the sockets with the white release levers.
- If memory modules with different speeds are installed, they operate at the speed of the slowest installed memory module(s).

Mode-Specific Guidelines

Three memory channels are allocated to each processor. The number of channels used and the allowable configurations depend on the memory mode selected.

Optimizer (Independent Channel) Mode

In this mode, all three channels are populated with identical memory modules. This mode permits a larger total memory capacity but does not support SDDC with x8-based memory modules.

A minimal single-channel configuration of one 1 GB memory module per processor is also supported in this mode.

Table 3-1 shows sample memory configurations that follow the appropriate memory guidelines stated in this section. The samples show identical memory-module configurations and their the physical and available memory totals. The tables do not show mixed or quad-rank memory-module configurations, nor do they address the memory speed considerations of any configuration.

Supported Memory Configuration

There are eighteen DIMMs on each system board to support the processor 0 and processor 1. The DIMM sequence of eighteen DIMM sockets is respectively shown below. When you insert the DIMM(s), you have to always start with DIMM0_CHA. See the following for possible memory configurations.

Table 3-1. Memory Configuration

No. of DIMMs	POR Speed	1N or 2N	DIMM 2	DIMM 1	DIMM 0
1	DDR3-1333	1N	_	_	Single-rank
2	DDR3-1333	1N	_	_	Dual-rank
3	DDR3-1066	1N	_	_	Quad-rank
4	DDR3-1333	1N	_	Single-rank	Single-rank
5	DDR3-1333	1N	_	Single-rank	Dual-rank
6	DDR3-1333	1N	_	Dual-rank	Single-rank
7	DDR3-1333	1N	_	Dual-rank	Dual-rank
8	DDR3-800	1N	_	Single-rank	Quad-rank
9	DDR3-800	1N	_	Dual-rank	Quad-rank
10	DDR3-800	1N	_	Quad-rank	Quad-rank
11	DDR3-800	1N	Single-rank	Single-rank	Single-rank
12	DDR3-800	1N	Single-rank	Single-rank	Dual-rank
13	DDR3-800	1N	Single-rank	Dual-rank	Single-rank
14	DDR3-800	1N	Dual-rank	Single-rank	Single-rank
15	DDR3-800	1N	Single-rank	Dual-rank	Dual-rank
16	DDR3-800	1N	Dual-rank	Single-rank	Dual-rank
17	DDR3-800	1N	Dual-rank	Dual-rank	Single-rank
18	DDR3-800	1N	Dual-rank	Dual-rank	Dual-rank

NOTE: An empty DIMM socket is marked as "_". For the best performance, all the DIMMs installed must be of the same speed, capacity, and the DIMMs must be from one manufacturer.

Removing Memory Modules

WARNING: The memory modules are hot to touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

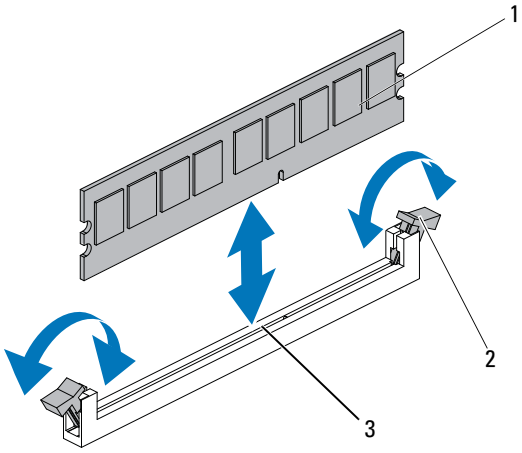
1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Locate the memory module sockets.
5. Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See Figure 3-9.

   Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

CAUTION: Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.

6. Lift out the memory module.
7. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
8. Close the system. See "Closing the System" on page 54.
9. Reconnect the system to its electrical outlet and turn on the system, including any attached peripherals.

Figure 3-9. Removing and Installing a Memory Module



1	memory module	2	memory module socket ejectors (2)
3	alignment key		

Installing Memory Modules

1. Locate the memory module sockets.
2. Press the ejectors on the memory module socket down and out, as shown in Figure 3-9, to allow the memory module to be inserted into the socket.

   Handle each memory module only on either card edge, making sure not to touch the middle of the memory module.
3. Align the memory module's edge connector with the alignment key of the memory module socket, and insert the memory module in the socket.

   NOTE: The memory module socket has an alignment key that allows you to install the memory module in the socket in only one way.
4. Press down on the memory module with your thumbs until the ejectors lock into position. See Figure 3-9.

   When the memory module is properly seated in the socket, the ejectors on the memory module socket align with the ejectors on the other sockets that have memory modules installed.

5 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.

6 Close the system. See "Closing the System" on page 54.

7 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

8 Start up the system, press <F2> to enter the System Setup program, and check the **System Memory** settings on the main System Setup screen.

The system should have already changed the value to reflect the newly installed memory.

9 If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat step 3 through step 8 of this procedure, checking to ensure that the memory modules are firmly seated in their sockets.

Expansion-Card Riser and Expansion Card

CAUTION: Expansion cards can only be installed in the slots on the expansion-card riser. Do not attempt to install expansion cards directly into the riser connector on the system board.

Removing the Expansion-Card Riser

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

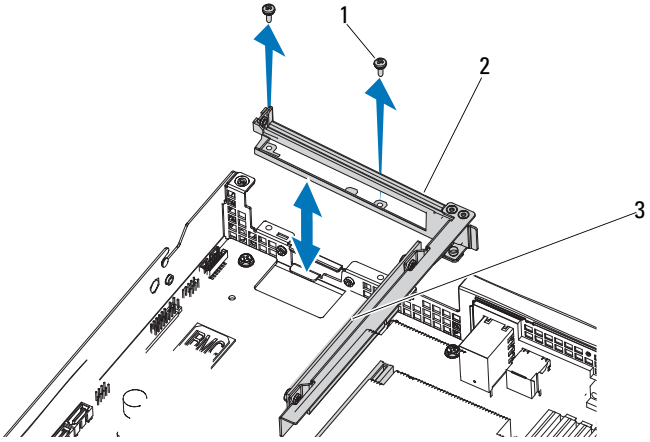
2 Open the system. See "Opening the System" on page 53.

3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.

4 Remove the two screws that secure the expansion-card riser assembly.

5 Lift the expansion-card riser assembly out of the system board. See Figure 3-10.

Figure 3-10. Removing and Installing the Expansion-Card Riser



1	screws (2)	2	expansion-card riser assembly
3	expansion-card riser		

Installing the Expansion-Card Riser

1. Replace the expansion-card riser assembly in the system.
2. Secure the expansion-card riser assembly in place with the screws. See Figure 3-10.
3. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
4. Replace the system cover. See "Closing the System" on page 54.
5. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Removing the Expansion Card

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Remove the screws securing the expansion card to the expansion-card riser.
2. Pull out the expansion card from the expansion-card riser. See Figure 3-11.

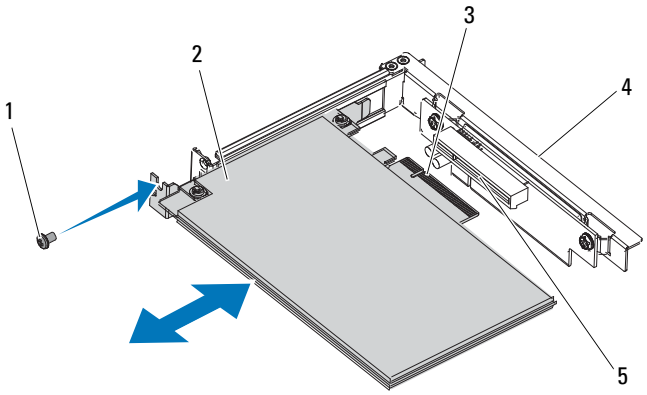
CAUTION: Disconnecting the RAID battery cable from a PERC card can cause data loss if the "dirty cache" LED on the card is lit. The LED indicates that data is still cached in controller memory and the data was not cleared at system shutdown.

3. If applicable, disconnect the RAID battery cable from the expansion card.
4. Insert the filler bracket.

   NOTE: Keep this bracket in case you need to remove the expansion card. Filler brackets must be installed over empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

5. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
6. Replace the system cover. See "Closing the System" on page 54.
7. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Figure 3-11. Removing and Inserting the Expansion Card



1	screw	2	expansion card
3	expansion card connector	4	expansion-card riser
5	riser guide slot		

NOTE: You must install a filler bracket over an empty expansion slot to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

Installing the Expansion Card

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.

3 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.

4 If applicable, remove the filler bracket.

5 Align the expansion card with the riser guide slot and push it in the direction of the arrow in the image until it sits in the card connector. See Figure 3-11.

6 For a battery-cached RAID controller, connect the RAID battery cable to the expansion card.

7 Close the system. See "Closing the System" on page 54.

8 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

RAID Battery (Optional)

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: The information in this section applies only to systems with the optional RAID controller card.

Removing a RAID Battery

1 Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.

2 Open the system. See "Opening the System" on page 53.

3 Pull back gently on the right edge of the battery bay and draw out the RAID battery from the battery carrier.

4 Disconnect the cable between the RAID battery and the storage controller card. See Figure 3-12.

Installing a RAID Battery

1 Connect the RAID battery cable to the connector on the RAID battery.

2 Locate the RAID battery bay on top of the hard drive bays. See Figure 3-1.

3 With the cable oriented toward the back, angle the left side of the RAID battery into the left side of the battery bay.

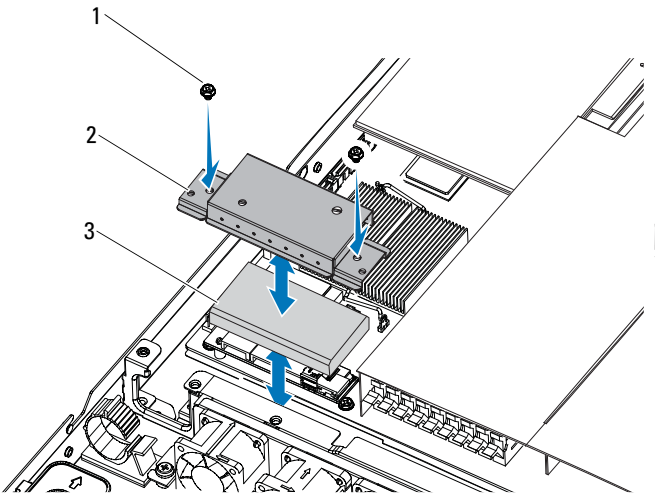
4 Rotate the right side of the RAID battery down and press into the locked position.

5 Connect the RAID battery cable to the RAID battery connector on the storage controller. See Figure 3-12.

6 Close the system. See "Closing the System" on page 54.

7 Reconnect your system and peripherals to their electrical outlets, and turn on the system.

Figure 3-12. Removing or Installing a RAID Battery



1 screws (2)

2 RAID battery bay

3 RAID battery

Integrated Storage Controller Cards

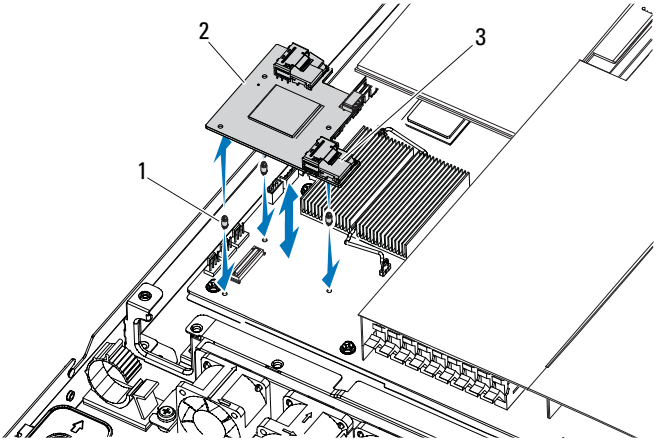
Your system includes a dedicated expansion-card slot on the system board for an integrated SAS controller card that provides the integrated storage subsystem for your system's hard drives. The controller supports SAS, SATA, and SSD hard drives and also enables you to set up the hard drives in RAID configurations as supported by the version of the storage controller included with your system.

Removing the Integrated Storage Controller Card

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Disconnect the SAS cables connected to the storage controller card.
4. Lift the integrated storage controller to remove it from the system board.
5. Remove the three spacer pins and store them securely for later use. See Figure 3-13.

Figure 3-13. Removing and Installing the Integrated Storage Controller Card



1 spacer pins (3) 2 integrated storage controller card

3 SAS cables connector

Installing the Integrated Storage Controller Card

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Place the three spacer pins on the system board. See Figure 3-13.
4. Install the integrated storage controller card in place. See Figure 3-13.
5. Connect the SAS data cable to the integrated storage controller card.
6. Close the system. See "Closing the System" on page 54.
7. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

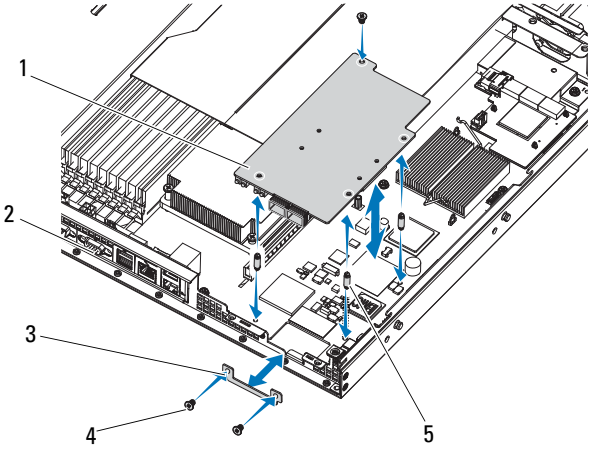
Mezzanine Card (10 GbE LAN)

Removing the Mezzanine Card (10 GbE LAN)

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

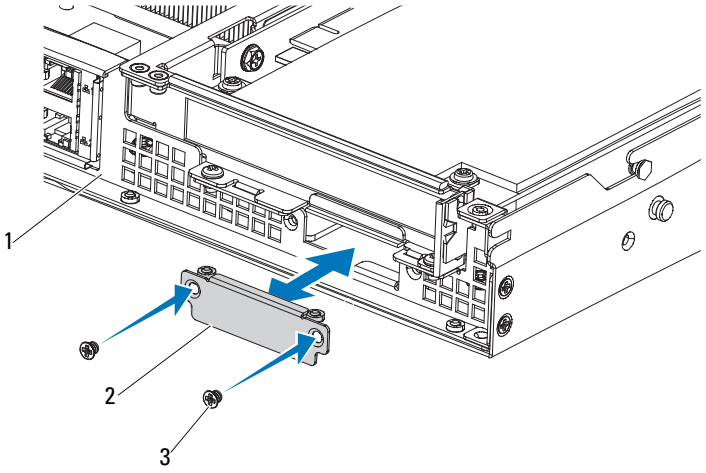
1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Remove the riser card assembly. See "Removing the Expansion-Card Riser" on page 66.
5. Remove the three spacer pins on the mezzanine card.
6. Remove the single screw securing the card and remove the card. See Figure 3-14.
7. If you are not installing another mezzanine card, install the mezzanine-card cover and secure with two screws. See Figure 3-15.

Figure 3-14. Removing and Installing the Mezzanine Card (10 GbE LAN)



1	mezzanine card (10 GbE LAN)	2	back panel
3	mezzanine-card cover	4	screws (3)
5	spacer pins (3)		

Figure 3-15. Removing and Installing the Mezzanine-Card Cover (10 GbE LAN)



1	back panel	2	mezzanine-card cover
3	screws (2)		

Installing the Mezzanine Card (10 GbE LAN)

1. If you are installing a mezzanine card for the first time, remove the two screws securing the mezzanine-card cover and remove the cover. See Figure 3-15.
2. Align the spacer pins on the mezzanine card with the holes on the system board.

   NOTE: The three spacer pins must be inserted through the board for proper installation of the mezzanine card.
3. Secure the board using the screw. See Figure 3-14.
4. Replace the riser card assembly. See "Installing the Expansion-Card Riser" on page 67.
5. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
6. Replace the system cover. See "Closing the System" on page 54.
7. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Power Supplies

WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

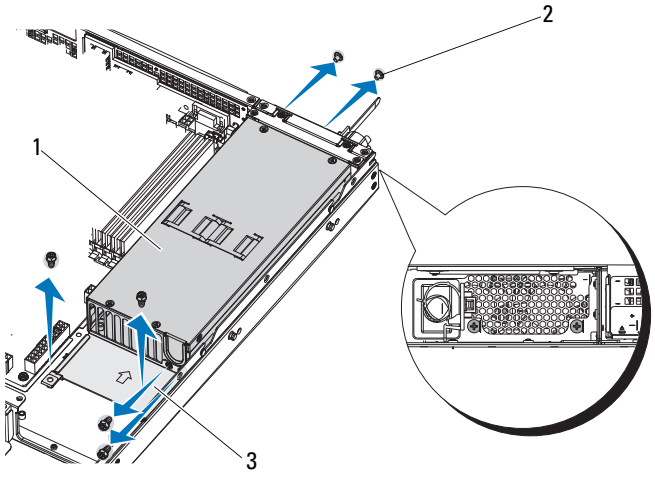
Removing the Non-Redundant Power Supply

WARNING: In order to reduce the risk of injury from electric shock, disconnect the failed power supply from the AC power before removing it from the system.

CAUTION: The system requires one power supply to operate the system normally. Remove and replace only one power supply at a time.

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Disconnect the power supply from the system.
3. Remove the cables connecting the power supply to the system board and backplane. See Figure 5-2, Figure 5-4, and Figure 5-6.
4. Remove the two screws securing the power supply to the system.
5. Remove the four screws securing the bracket to the power module.
6. Lift the bracket and power supply out of the system. See Figure 3-16.

Figure 3-16. Removing and Installing the Non-Redundant Power Supply



1	power supply	2	screws (6)
3	bracket		

Installing the Non-Redundant Power Supply

1. Insert the replacement power supply and the securing bracket firmly into the bay. See Figure 3-16.
2. Replace the two screws at the back.
3. Replace the four screws securing the bracket.
4. Replace the cables connecting the power supply to the system board and backplane. See Figure 5-2, Figure 5-4, and Figure 5-6.
5. Replace the system cover. See "Closing the System" on page 54.
6. Connect the power cable to the power supply and plug the cable into a power outlet.
7. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

Removing the Redundant Power Supply

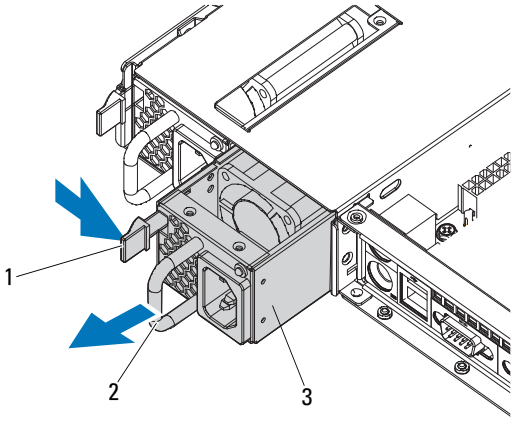
WARNING: In order to reduce the risk of injury from electric shock, disconnect the failed power supply from the AC power before removing it from the system.

CAUTION: The system requires one power supply to operate the system normally. Remove and replace only one power supply at a time.

1. Disconnect the power cable from the power supply.
2. Press the lever release latch on the left side of the power supply and slide out the power supply using the power supply handle. See Figure 3-17.

NOTE: Install a power supply blank if you are not replacing the power supply.

Figure 3-17. Removing and Installing the Redundant Power Supply



1 release latch
2 power supply handle
3 power supply

Installing the Redundant Power Supply

1. Verify that both power supplies are of the same type and have the same maximum output power.
2. Slide the new power supply into the system until the power supply is fully seated and the release latch snaps into place. See Figure 3-17.
3. Reconnect your system and peripherals to their electrical outlets, and turn on the system.

NOTE: When installing, hot-swapping, or hot-adding a new power supply in a system with two power supplies, allow several seconds for the system to recognize the power supply and determine its status. The power-supply status indicator turns green to signify that the power supply is functioning properly. See Figure 1-4.

Power Distribution Board

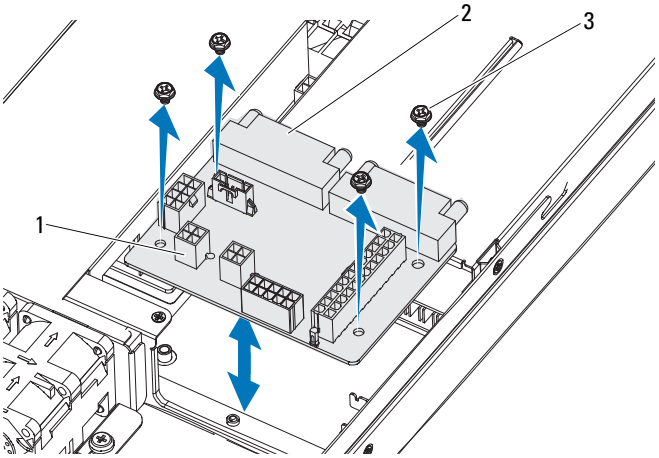
CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: The power distribution board is available only for redundant power supplies.

Removing the Power Distribution Board

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Remove the power supplies from the system. "Removing the Redundant Power Supply" on page 79.
5. Remove the expansion card riser. See "Removing the Expansion-Card Riser" on page 66.
6. Remove all the cables from the power distribution board. See Figure 5-7.
7. Remove the four securing screws from the power distribution board.
8. Lift the power distribution board out of the system. See Figure 3-18.

Figure 3-18. Removing and Installing the Power Distribution Board



1 fan module cable connector
2 power distribution board
3 screws (4)

Installing the Power Distribution Board

1. Place the power distribution board on the system and secure it with the four screws. See Figure 3-18.
2. Connect the cables to the power distribution board. See Figure 5-7.
3. Connect the power distribution cables to the system board. See "System Board" on page 93.
4. Install the expansion card riser. See "Installing the Expansion-Card Riser" on page 67.
5. Install the power supplies to the system. See "Installing the Redundant Power Supply" on page 80.
6. Install the cooling shroud. See "Installing the Cooling Shroud" on page 55.
7. Replace the system cover. See "Closing the System" on page 54.
8. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Cooling Fans

WARNING: The cooling fan can continue to spin for some time after the system has been powered down. Allow time for the fan to stop spinning before removing it from the system.

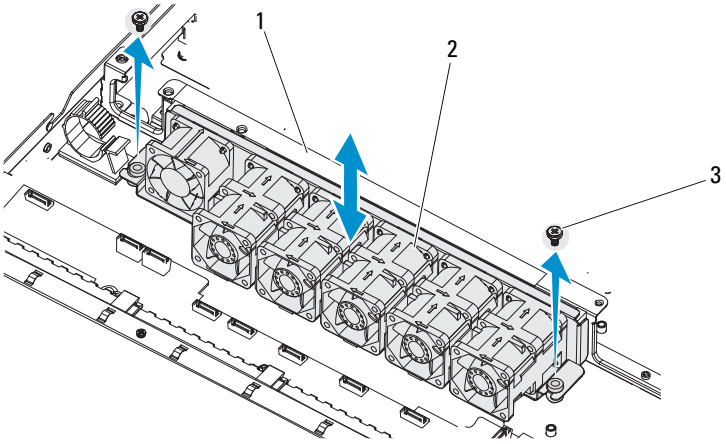
WARNING: Do not attempt to operate the system without the cooling fans.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing a Cooling Fan Assembly

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Disconnect all fan cables. See Figure 5-4 and Figure 5-6.
5. Remove the two screws securing the fan assembly in place.
6. Lift the fan assembly away from the system. See Figure 3-19.

Figure 3-19. Removing and Installing the Fan Assembly



1 fan assembly
2 cooling fans (6)
3 screws (2)

Installing the Cooling Fan Assembly

1. Place the fan assembly into the system and align the holes on the fan assembly with the holes on the chassis.
2. Replace the two screws that secure the fan assembly to the chassis.
3. Connect the power cables to the cooling fans.
4. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
5. Replace the system cover. See "Closing the System" on page 54.
6. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Expander Board

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Expander Board

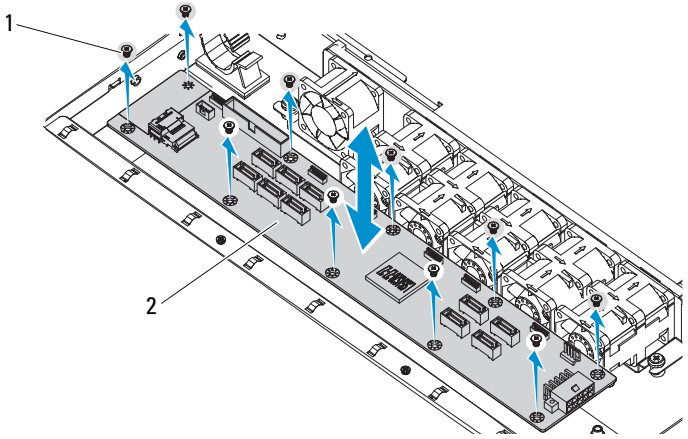
1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Disconnect all cooling fan power cables.
5. Remove the cooling fan assembly. See "Removing a Cooling Fan Assembly" on page 82.
6. Disconnect the SATA cables, the IPMB cable, and the power cable. See Figure 5-6.

CAUTION: To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.

CAUTION: You must note the number of each hard drive and temporarily label them before removal so that you can replace them in the same locations.

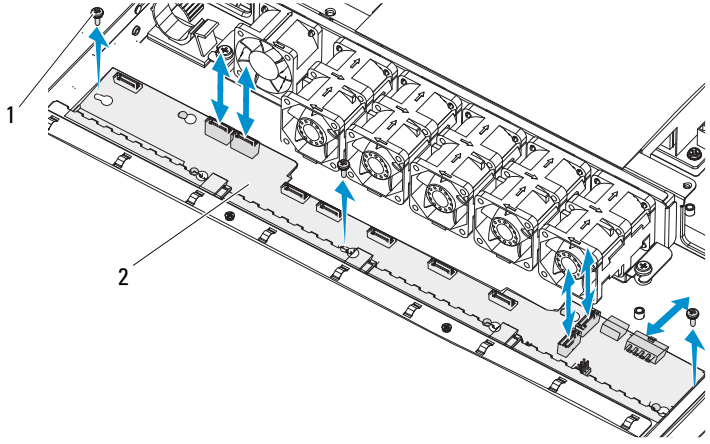
7. Remove the screws that secure the expander board. See Figure 3-21.
8. Lift the expander board clear of the system.

Figure 3-20. Removing and Installing the Expander Board—2.5-Inch Hard-Drive System



1 screws (10) 2 expander board

Figure 3-21. Removing and Installing the Expander Board–3.5-Inch Hard-Drive System



1 screws (3) 2 expander board

Installing the Expander Board

1. Insert the expander board in the direction of the arrow until it is seated in the system.
2. Replace all the hard drives in the system. See "Installing a Hard-Drive Carrier" on page 52.
3. Replace the cooling fan assembly and secure with the two screws.
4. Connect all cooling fan power cables.
5. Connect the four SATA cables, the IPMB cable, and the power cable. See Figure 5-6.
6. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
7. Replace the system cover. See "Closing the System" on page 54.
8. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

Backplane

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Backplane

1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Disconnect all cooling fan power cables.
5. Remove the two screws holding the fan assembly in place and remove the assembly.

6 Disconnect the SATA cables, the IPMB cable, and the power cable. See Figure 5-4.

CAUTION: To prevent damage to the drives and backplane, you must remove the hard drives from the system before removing the backplane.

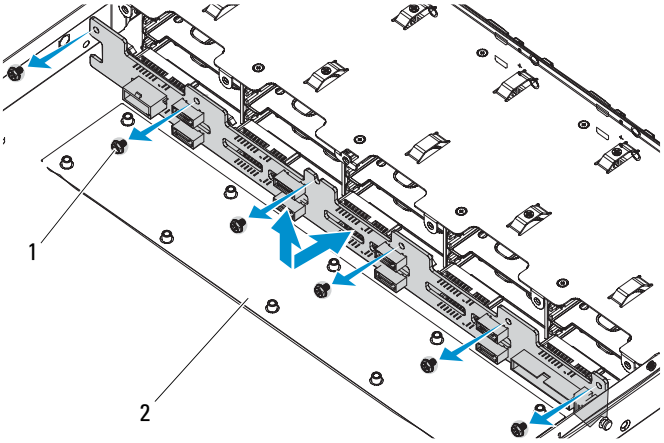
CAUTION: You must note the number of each hard drive and temporarily label them before removal so that you can replace them in the same locations.

7 Remove all the hard drives. See "Removing a Hard-Drive Carrier" on page 52.

8 Remove the six screws that secure the backplane. See Figure 3-21.

9 Slide the board up and lift the backplane clear of the system.

Figure 3-22. Removing and Installing the Backplane



1 screws (6)

2 expander board

Installing the Backplane

1. Insert the backplane in the direction of the arrow until it is seated in the system.
2. Replace all the hard drives in the system. See "Installing a Hard-Drive Carrier" on page 52.
3. Replace the cooling fan assembly and secure with the two screws.
4. Connect all cooling fan power cables.
5. Connect the SATA cables, the IPMB cable, and a single power cable. See Figure 5-4.
6. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
7. Replace the system cover. See "Closing the System" on page 54.
8. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

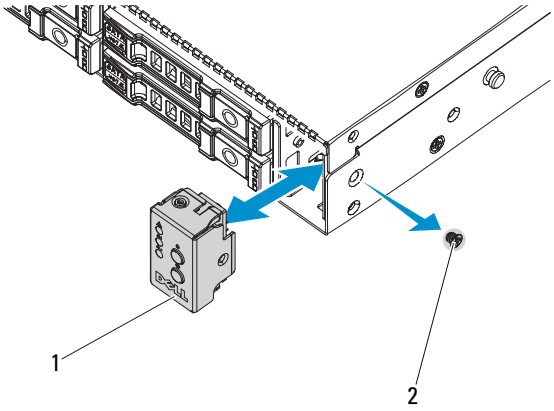
Control Panel (Optional)

Removing the Control Panel

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Remove the single securing screw from the side of the chassis. See Figure 3-23.
3. Pull the control panel out of the chassis. See Figure 3-23.

Figure 3-23. Removing and Installing the Control Panel



1 control panel 2 screw

Installing the Control Panel

1. Replace the control panel on the chassis. See Figure 3-23.
2. Secure with the single screw.

Control Panel Assembly (Optional)

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Control Panel Assembly

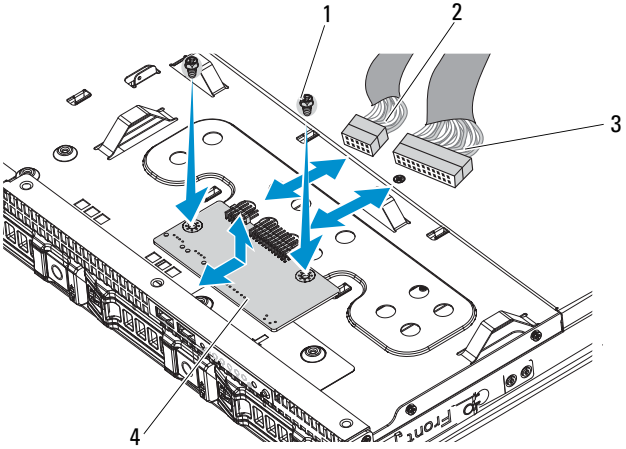
1. Turn off the system, including any attached peripherals, and disconnect the system from its electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the eight securing screws on the front and sides of the system cover.

4 Slide the cover away toward the back of the system to remove it.

5 Disconnect the USB and LED signal cables and remove the two securing screws.

6 Slide the front LED Board toward the front of the system to remove it.

Figure 3-24. Removing the Control Panel Assembly



1	screws (2)	2	USB cable
3	LED signal cable	4	front LED board

Installing the Control Panel Assembly

1 Slide the front LED Board toward the front of the system and secure in place with the eight screw on the front and sides of the system cover.

2 Connect the USB and LED signal cables and secure in place with the two screws.

3 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.

4 Replace the system cover. See "Closing the System" on page 54.

5 Reconnect the system and peripherals to their electrical outlets, and turn on the system.

System Battery

Removing the System Battery

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

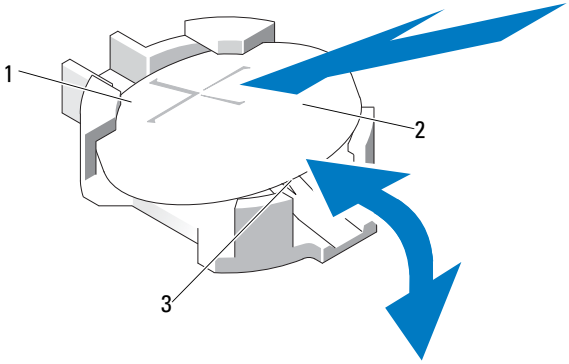
WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. See your safety information for additional information.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Locate the battery socket. See "System Board Connectors" on page 111.

CAUTION: To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.

5. Support the battery connector by pressing down firmly on the positive side of the connector.
6. Press the battery toward the positive side of the connector and lift it out of the securing tabs at the negative side of the connector.

Figure 3-25. Removing and Installing the System Battery



1 positive side of battery connector 2 system battery

3 negative side of battery connector

Installing the System Battery

1. Support the battery connector by pressing down firmly on the positive side of the connector.
2. Hold the battery with the "+" facing up, and slide it under the securing tabs at the positive side of the connector.
3. Press the battery straight down into the connector until it snaps into place.
4. Install the cooling shroud. See "Installing the Cooling Shroud" on page 55.
5. Close the system. See "Closing the System" on page 54.
6. Reconnect the system to the electrical outlet and turn the system on, including any attached peripherals.
7. Enter the System Setup program to confirm that the battery is operating properly. See "Using the System Setup Program" on page 33.
8. Enter the correct time and date in the System Setup program's **Time** and **Date** fields, and re-enter any customized option settings as needed.
9. Exit the System Setup program.

System Board

WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

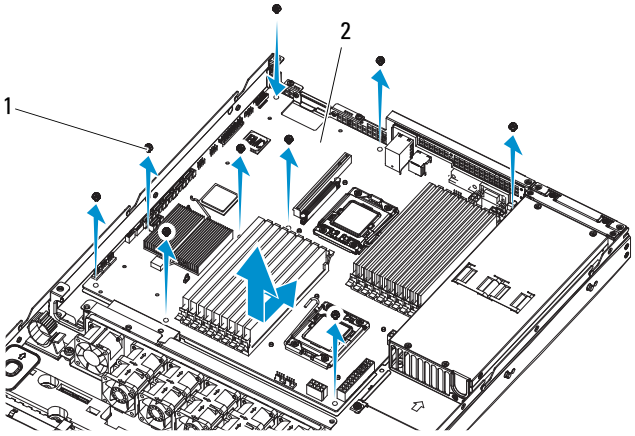
Removing the System Board

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.
4. Remove all memory modules. See "Removing Memory Modules" on page 64.
5. Remove the expansion card-riser. See "Removing the Expansion-Card Riser" on page 66.
6. Remove the heat sinks. See "Removing the Heat Sink" on page 56.
7. Remove the processors. See "Removing the Processor" on page 58.
8. Disconnect the power, IPMB, SATA, front panel, and system board cable connectors from the motherboard.

CAUTION: Do not lift the system board assembly by grasping a memory module, processor, or other components.

9. Loosen the ten screws securing the system board, and then slide the board back, up and out of the system. See Figure 3-26.

Figure 3-26. Removing and Installing the System Board



1 screws (10) 2 system board assembly

Installing the System Board

1. Align the holes A and B on the system board to position the board correctly in the system.
2. Replace the ten screws to secure the system board in place.
3. Reconnect the power, IPMB, SATA, front panel, and system board connectors to the system board. See "System Board Connectors" on page 111.
4. Replace the processors. See "Installing the Processor" on page 59.
5. Replace the heat sinks. See "" on page 57.
6. Replace the expansion-card riser. See "Installing the Expansion-Card Riser" on page 67.
7. Replace the memory modules. See "Installing Memory Modules" on page 65.
8. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.
9. Replace the system cover. See "Closing the System" on page 54.
10. Reconnect the system and peripherals to their electrical outlets, and turn on the system.

4

Troubleshooting Your System

Safety First—For You and Your System

WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

WARNING: Before removing the system cover, disconnect all power, then unplug the AC power cord, and then disconnect all peripherals, and all LAN lines.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Installation Problems

Perform the following checks if you are troubleshooting an installation problem:

- Check all cable and power connections (including all rack cable connections).
- Unplug the power cord and wait for one minute. Then reconnect the power cord and try again.
- If the network is reporting an error, verify that the system has enough memory and disk space.
- Remove all added peripherals, one at a time, and try to turn on the system. If after removing a peripheral the system works, it may be a problem with the peripheral or a configuration problem between the peripheral and the system. Contact the peripheral vendor for assistance.
- If the system does not power on, check the LED display. If the power LED is not on, you may not be receiving AC power. Check the AC power cord to make sure that it is securely connected.

Troubleshooting System Startup Failure

If your system halts during startup prior to video imaging, especially after installing an operating system or reconfiguring your system's hardware, check for the following conditions. See "System Memory" on page 61.

For all other startup issues, note the LED panel indicators and any system messages that appear onscreen. See "Power and System Board Indicator Codes" on page 19 for more information.

Troubleshooting External Connections

Ensure that all external cables are securely attached to the external connectors on your system before troubleshooting any external devices. See Figure 1-1, Figure 1-2, and Figure 1-4 for the front- and back-panel connectors on your system.

Troubleshooting the Video Subsystem

1. Check the system and power connections to the monitor.
2. Check the video interface cabling from the system to the monitor.

Troubleshooting a USB Device

Use the following steps to troubleshoot a USB keyboard and/or mouse. For other USB devices, go to step 5.

1. Disconnect the keyboard and mouse cables from the system briefly and reconnect them.
2. Connect the keyboard/mouse to the USB port(s) on the opposite side of the system.
3. If the problem is resolved, restart the system, enter the System Setup program, and check if the nonfunctioning USB ports are enabled.
4. Replace the keyboard/mouse with another working keyboard/mouse.

   If the problem is resolved, replace the faulty keyboard/mouse.

   If the problem is not resolved, proceed to the next step to begin troubleshooting the other USB devices attached to the system.

5 Power down all attached USB devices and disconnect them from the system.

6 Restart the system and, if your keyboard is functioning, enter the system setup program. Verify that all USB ports are enabled. See "USB Configuration" on page 39 .

If your keyboard is not functioning, you can also use remote access. If the system is not accessible, see "Jumper Settings" on page 112 for instructions on setting the NVRAM_CLR jumper inside your system and restoring the BIOS to the default settings.

7 Reconnect and power on each USB device one at a time.

8 If a device causes the same problem, power down the device, replace the USB cable, and power up the device.

If the problem persists, replace the device.

If all troubleshooting fails, see "Getting Help" on page 119.

Troubleshooting a Serial I/O Device

1 Turn off the system and any peripheral devices connected to the serial port.

2 Swap the serial interface cable with another working cable, and turn on the system and the serial device.

If the problem is resolved, replace the interface cable.

3 Turn off the system and the serial device, and swap the device with a comparable device.

4 Turn on the system and the serial device.

If the problem is resolved, replace the serial device.

If the problem persists, see "Getting Help" on page 119.

Troubleshooting a NIC

1. Restart the system and check for any system messages pertaining to the NIC controller.
2. Check the appropriate indicator on the NIC connector. See "NIC Indicator Codes" on page 18.
   - If the link indicator does not light, check all cable connections.
   - If the activity indicator does not light, the network driver files might be damaged or missing.

     Remove and reinstall the drivers if applicable. See the NIC's documentation.
   - Change the auto-negotiation setting, if possible.
   - Use another connector on the switch or hub.

   If you are using a NIC card instead of an integrated NIC, see the documentation for the NIC card.
3. Ensure that the appropriate drivers are installed and the protocols are bound. See the NIC's documentation.
4. Enter the System Setup program and confirm that the NIC ports are enabled. See "NIC Indicator Codes—BMC" on page 19.
5. Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed. See the documentation for each network device.
6. Ensure that all network cables are of the proper type and do not exceed the maximum length.

   If all troubleshooting fails, see "Getting Help" on page 119.

Troubleshooting a Wet System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Disassemble components from the system. See "Installing System Components" on page 47.
   - Cooling shroud
   - Hard drives
   - Backplane
   - Expansion-card riser
   - Power supplies
   - Fans
   - Processors and heat sinks
   - Memory modules
4. Let the system dry thoroughly for at least 24 hours.
5. Reinstall the components you removed in step 3.
6. Close the system. See "Closing the System" on page 54.
7. Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

   If the system does not start properly, see "Getting Help" on page 119.
8. If the system starts properly, shut down the system and reinstall all of the expansion cards that you removed. See "Installing the Expansion Card" on page 69.
9. If the system fails to start, see "Getting Help" on page 119.

Troubleshooting a Damaged System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 53.
3. Ensure that the following components are properly installed:
   - Expansion-card riser
   - Power supplies
   - Fans
   - Hard drives
   - Processors and heat sinks
   - Memory modules
   - Cooling shroud
4. Ensure that all cables are properly connected.
5. Close the system. See "Closing the System" on page 54.
6. If the system fails to start, see "Getting Help" on page 119.

Troubleshooting the System Battery

NOTE: If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is caused by a defective battery.

1. Re-enter the time and date through the System Setup program. See "System Setup Options at Boot" on page 34.
2. Turn off the system and disconnect it from the electrical outlet for at least one hour.
3. Reconnect the system to the electrical outlet and turn on the system.

4 Enter the System Setup program.

If the date and time are not correct in the System Setup program, replace the battery. See "Installing the System Battery" on page 92.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

If the problem is not resolved by replacing the battery, see "Getting Help" on page 119.

NOTE: Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time kept in the System Setup program, the problem may be caused by software rather than by a defective battery.

Troubleshooting Power Supplies

1 Identify the faulty power supply by the power supply's fault indicator. See "Power and System Board Indicator Codes" on page 19.

CAUTION: At least one power supply must be installed for the system to operate. Operating the system with only one power supply installed for extended periods of time can cause the system to overheat.

2 Reseat the power supply by removing and reinstalling it. See "Installing the Redundant Power Supply" on page 80 or "Installing the Non-Redundant Power Supply" on page 78.

NOTE: After installing a power supply, allow several seconds for the system to recognize the power supply and to determine if it is working properly. The power indicator turns green to signify that the power supply is functioning properly.

If the problem persists, replace the faulty power supply.

3 If all troubleshooting fails, see "Getting Help" on page 119.

Troubleshooting System Cooling Problems

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Ensure that none of the following conditions exist:

- System cover, cooling shroud, drive blank, power supply blank, or front or back filler panel is removed.
- Ambient temperature is too high.
- External airflow is obstructed.
- Cables inside the system obstruct airflow.
- An individual cooling fan is removed or has failed. See "Troubleshooting a Fan" on page 102.

Troubleshooting a Fan

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Locate the faulty fan indicated by the LED panel.
2. Turn off the system and all attached peripherals.
3. Open the system. See "Opening the System" on page 53.
4. Reseat the fan's power cable.
5. Restart the system.

   If the fan functions properly, close the system. See "Closing the System" on page 54.

6 If the fan does not function, turn off the system and install a new fan. See "Installing the Cooling Fan Assembly" on page 83.

7 Restart the system.

If the problem is resolved, close the system. See "Closing the System" on page 54.

If the replacement fan does not operate, see "Getting Help" on page 119.

Troubleshooting System Memory

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: Invalid memory configurations can cause your system to halt at startup without video output. See "General Memory Module Installation Guidelines" on page 61 and verify that your memory configuration complies with all applicable guidelines.

1 If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least 10 seconds and then reconnect the system to power.

2 Turn on the system and attached peripherals and note the messages on the screen.

Go to step 13 if an error message appears indicating a fault with a specific memory module.

3 Enter the System Setup program and check the system memory setting. See "Memory Configuration" on page 38. Make any changes to the memory settings, if needed.

If the memory settings match the installed memory but a problem is still indicated, go to step 13.

4 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

5 Open the system. See "Opening the System" on page 53.

6 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 54.

7 Check the memory channels and ensure that they are populated correctly. See "General Memory Module Installation Guidelines" on page 61.

8 Reseat the memory modules in their sockets. See "Installing Memory Modules" on page 65.

9 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 55.

10 Close the system. See "Closing the System" on page 54.

11 Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.

12 Enter the System Setup program and check the system memory setting. See "System Memory Settings" on page 36.

If the problem is not resolved, proceed with the next step.

13 Turn off the system and attached peripherals, and disconnect the system from the power source.

14 Open the system. See "Opening the System" on page 53.

15 If an error message indicates a specific memory module as faulty, swap or replace the module.

16 To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity. See "Installing Memory Modules" on page 65.

17 Close the system. See "Closing the System" on page 54.

18 Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.

19 As the system boots, observe any error message that appears and the LED indicators on the front of the system.

20 If the memory problem is still indicated, repeat step 13 through step 19 for each memory module installed.

If the problem persists after all memory modules have been checked, see "Getting Help" on page 119.

Troubleshooting a Hard Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

CAUTION: This troubleshooting procedure can destroy data stored on the hard drive. Before you proceed, back up all files on the hard drive.

1. If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:
   a. Restart the system and enter the host adapter configuration utility program by pressing <Ctrl><R> for a PERC controller or <Ctrl><C> for a SAS controller.

      See the documentation supplied with the host adapter for information about the configuration utility.

   b. Ensure that the hard drive(s) have been configured correctly for the RAID array.

   c. Take the hard drive offline and reseat the drive. See "Removing a Hard-Drive Carrier" on page 52

   d. Exit the configuration utility and allow the system to boot to the operating system.
2. Ensure that the required device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.
3. Restart the system, enter the System Setup program, and verify that the controller is enabled and the drives appear in the System Setup program. See "Using the System Setup Program" on page 33.

   If the problem persists, see "Getting Help" on page 119.

Troubleshooting a Storage Controller

NOTE: When troubleshooting a SAS or SAS RAID controller, also see the documentation for your operating system and the controller.

1. Enter the System Setup program and ensure that the SAS controller is enabled. See "System Setup Options at Boot" on page 34.
2. Restart the system and press the applicable key sequence to enter the configuration utility program.
   - <Ctrl><C> for a SAS controller
   - <Ctrl><R> for a RAID controller

   See the controller's documentation for information about configuration settings.
3. Check the configuration settings, make any necessary corrections, and restart the system.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

4. Turn off the system and attached peripherals, and disconnect the system from its electrical outlet.
5. Remove the system-board assembly. See "Installing the System Board" on page 94.
6. Ensure that the controller card is firmly seated into the system board connector. See "Installing the Expansion Card" on page 69.
7. If you have a battery-cached RAID controller, ensure that the RAID battery is properly connected and, if applicable, the memory module on the RAID card is properly seated.
8. Verify that the cable connections between the SAS backplane(s) and the integrated storage controller are correct.

   Ensure that the cables are firmly connected to the storage controller and the SAS backplane board.

9 Install the system-board assembly. See "Installing the System Board" on page 94.

10 Reconnect the system to its electrical outlet, and turn on the system and attached peripherals.

If the problem persists, see "Getting Help" on page 119.

Troubleshooting Expansion Cards

NOTE: When troubleshooting an expansion card, see the documentation for your operating system and the expansion card.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 53.

3 Ensure that each expansion card is firmly seated in its connector. See "Installing the Expansion Card" on page 69.

4 Ensure that the expansion-card riser is firmly seated in its connector. See "Installing the Expansion-Card Riser" on page 67.

5 Close the system. See "Closing the System" on page 54.

6 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

7 If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

8 Open the system. See "Opening the System" on page 53.

9 Remove all expansion cards installed in the system. See "Removing the Expansion Card" on page 68.

10 Close the system. See "Closing the System" on page 54.

11 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

12 For each expansion card you removed in step 9, perform the following steps:

a Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

b Open the system. See "Opening the System" on page 53.

c Reinstall one of the expansion cards.

d Close the system. See "Closing the System" on page 54.

Troubleshooting Processors

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 53.

3 Ensure that each processor and heat sink are properly installed. See "Installing the Processor" on page 59.

4 Close the system. See "Closing the System" on page 54.

5 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

6 If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

7 Open the system. See "Opening the System" on page 53.

8 Remove processor 2. See "Removing the Processor" on page 58.

9 Close the system. See "Closing the System" on page 54.

10 Reconnect the system to the electrical outlet, and turn on the system and attached peripherals.

11 If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

12 Open the system. See "Opening the System" on page 53.

13 Replace processor 1 with processor 2. See "Installing the Processor" on page 59.

14 Repeat step 9 through step 11.

If you have tested both the processors and the problem persists, the system board is faulty. See "Getting Help" on page 119.

IRQ Assignment Conflicts

Most PCI devices can share an IRQ with another device, but they cannot use an IRQ simultaneously. To avoid this type of conflict, see the documentation for each PCI device for specific IRQ requirements.

Table 4-1. Assignment Specific IRQ Requirements

IRQ Line	Assignment	IRQ Line	Assignment
IRQ0	System timer	IRQ8	Real-time clock
IRQ1	Keyboard controller	IRQ9	ACPI functions (used for power management)
IRQ2	Interrupt controller 1 to enable IRQ8 through IRQ15	IRQ10	Available
IRQ3	Default for COM2	IRQ11	Available
IRQ4	Default for COM1	IRQ12	Available
IRQ5	Remote access controller	IRQ13	Math coprocessor
IRQ6	Reserved	IRQ14	IDE CD drive controller
IRQ7	Reserved	IRQ15	Available

Troubleshooting Changes in BIOS Settings

Certain changes in BIOS settings (such as chipset timing or latency, memory timing or latency, processor clock frequency, etc.) can cause a system to no longer boot.

If you are able to enter the BIOS Setup by pressing F2, reset the BIOS to factory defaults by pressing F9. Save and exit the BIOS Setup.

If you cannot enter the BIOS Setup, clear the CMOS by following instructions:

1. Power down system. Do not unplug the power cord.
2. Open the system chassis. For instructions, see your system manual.
3. Move jumper (J15) from the default operation position, covering pins 1 and 2, to the reset / clear position, remove the cover from pins 1 and 2.
4. Remove AC power.
5. Wait 5 seconds.
6. Move the jumper back to default position, covering pins 1 and 2.
7. Close the system.
8. Power up the system.

The CMOS is now cleared and can be reset by going into BIOS setup.

NOTE: Removing the AC power before performing the CMOS Clear operation causes the system to automatically power up and immediately power down, after the procedure is followed and AC power is re-applied. If this happens, remove the AC power cord again, wait 30 seconds, and reinstall the AC power cord. Power up system and proceed to the <F2> BIOS Setup Utility to reset the desired settings.

You may also need to perform a BIOS bank select after clearing the CMOS.

Collecting System Event Log for Investigation

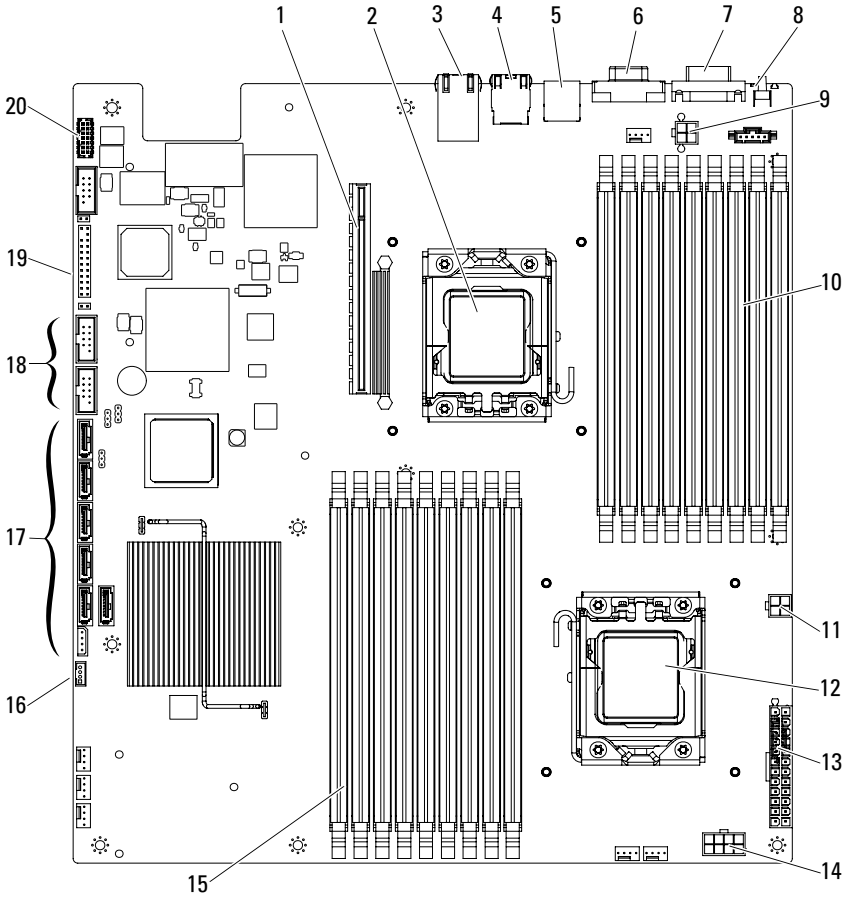
If the front panel LED blinks for 30 to 60 seconds upon applying AC power to the power supply, the baseboard management controller (BMC) is initializing. If not, then the BMC is not functioning. If the BMC is working, try to gather system event log (SEL) information for investigation.

5

Jumpers and Connectors

System Board Connectors

Figure 5-1. System Board Connectors



1	PCI-E daughter card connector	2	processor 0
3	ethernet connector port	4	KVM over IP Port
5	back USB connectors	6	video connector
7	serial connector	8	system identification button
9	processor 0 power connector 1	10	DDR3 DIMM slots (for processor 0) (9)
11	processor 0 power connector 2	12	processor 1
13	main power connector	14	processor 1 power connector
15	DDR3 DIMM slots (for processor 1) (9)	16	IPMB connector
17	SATA II connectors	18	front USB connectors
19	front panel connector	20	port 80

Jumper Settings

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

System Configuration Jumper Settings

The function of system configuration jumper installed on each system board is shown below.

Figure 5-2. System Configuration Jumpers

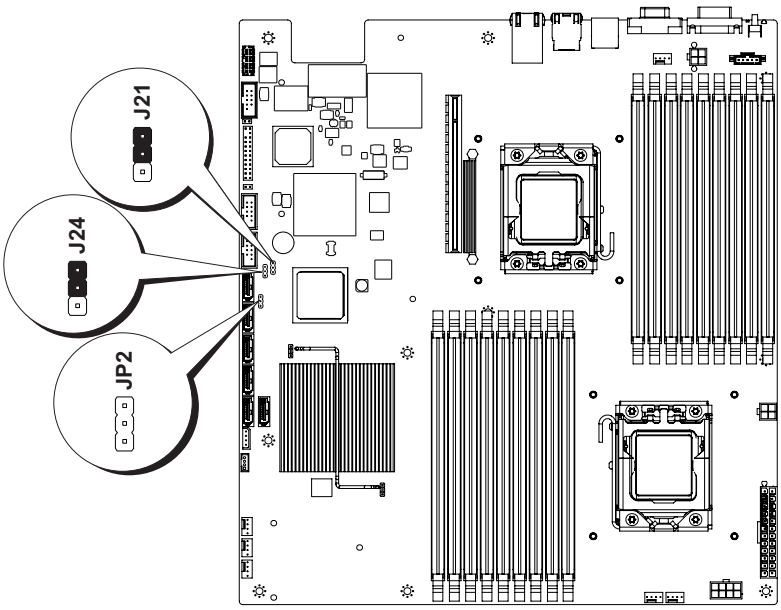


Table 5-1. System Configuration Jumpers

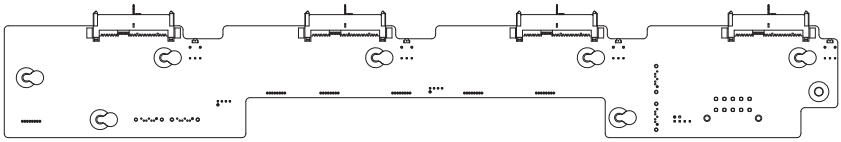
Jumper	Function	Off	On
J21	Password Setting	*Disable	Enable
J24	CMOS Setting	*Disable	Enable
JP2	BMC Disable	*Disable	Enable

NOTE: The "*" in the table of system configuration jumpers describes the default status and the default state is not active state.

Backplane Jumper Settings

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Figure 5-3. 3.5-Inch Hard-Drive Systems Backplane Jumpers



The function of jumpers installed on backplane is shown below:

Table 5-2. Jumpers Installed on Backplane

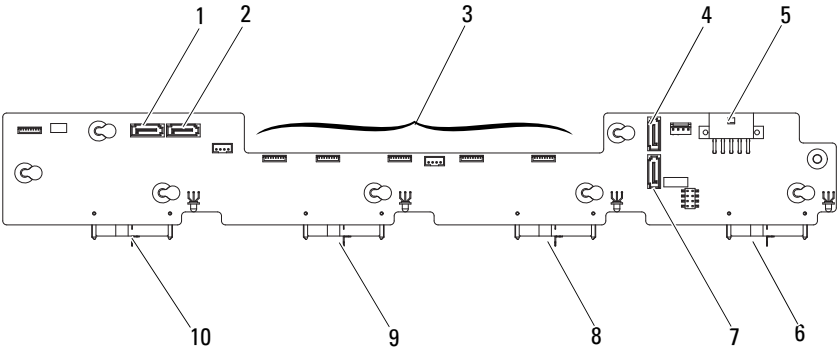
Jumper	Function	Off	On
J22	SGPIO connection	*Disable	Enable
J23	RAID Card setting	*Disable	Enable

NOTE: The "*" in the table of system configuration jumper describes the default status and the default state is not active state. When connecting the 1CH SAS daughter card, insert the jumper cover onto the hard drive type select jumper. For onboard SATAII connectors, do not insert the jumper cover onto the hard drive type select jumper.

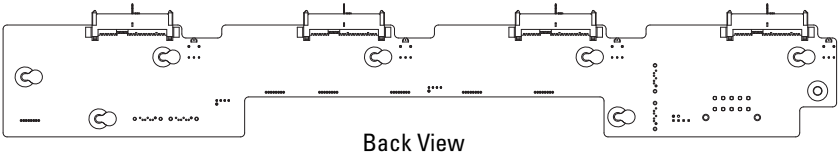
Backplane Connectors

3.5-Inch Hard Drives

Figure 5-4. 3.5-Inch Hard-Drive Systems Expander Board



Front View

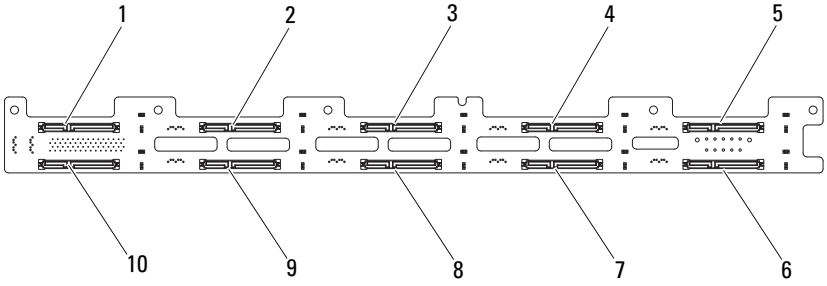


Back View

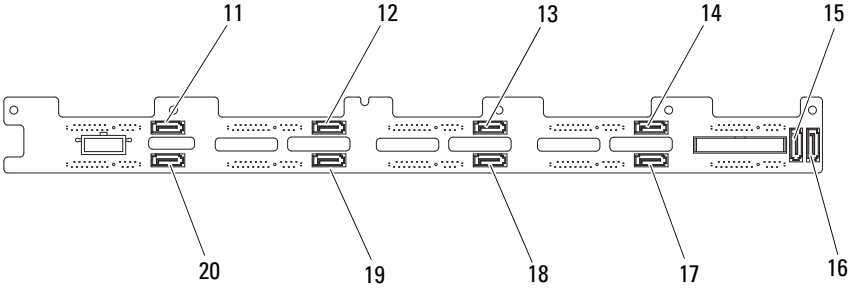
1	SATA0 connector	2	SATA1 connector
3	fan connectors	4	SATA2 connector
5	power connector	6	hard-drive 4 connector
7	SATA3 connector	8	hard-drive 3 connector
9	hard-drive 2 connector	10	hard-drive 1 connector

2.5-Inch Hard Drives

Figure 5-5. 2.5-Inch Hard-Drive Systems Backplane



Front View

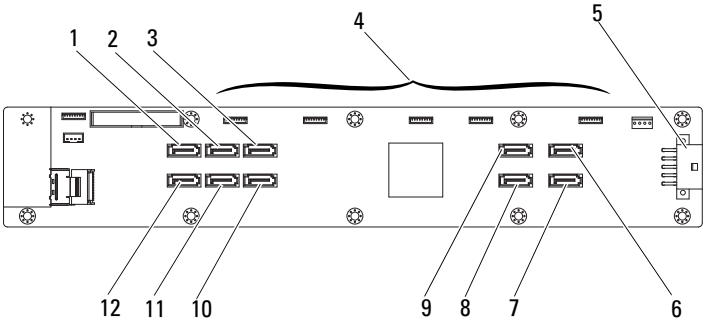


Back View

1	SAS0 connector for hard drive 1	2	SAS2 connector for hard drive 3
3	SAS4 connector for hard drive 5	4	SAS6 connector for hard drive 7
5	SAS8 connector for hard drive 9	6	SAS9 connector for hard drive 10
7	SAS7 connector for hard drive 8	8	SAS5 connector for hard drive 6
9	SAS3 connector for hard drive 4	10	SAS1 connector for hard drive 2
11	SATA8 connector	12	SATA6 connector

13	SATA4 connector	14	SATA2 connector
15	SATA1 connector	16	SATA0 connector
17	SATA3 connector	18	SATA5 connector
19	SATA7 connector	20	SATA9 connector

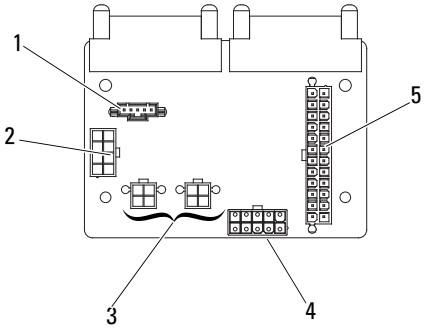
Figure 5-6. 2.5-Inch Hard-Drive Systems Expander Board



1	SATA0 connector	2	SATA2 connector
3	SATA4 connector	4	fan connectors
5	power connector	6	SATA8 connector
7	SATA9 connector	8	SATA7 connector
9	SATA6 connector	10	SATA5 connector
11	SATA3 connector	12	SATA1 connector

Power Distribution Board

Figure 5-7. Power Distribution Board



1	5-pin PMBus connector	2	8-pin power connector
3	4-pin power connectors	4	10-pin power connector
5	24-pin power connector		

6

Getting Help

Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).

NOTE: If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit **support.dell.com**.
2. Verify your country or region in the **Choose A Country/Region** drop-down menu at the bottom of the page.
3. Click **Contact Us** on the left side of the page.
4. Select the appropriate service or support link based on your need.
5. Choose the method of contacting Dell that is convenient for you.

Glossary

A — Ampere(s).

AC — Alternating current.

ACPI — Advanced Configuration and Power Interface. A standard interface for enabling the operating system to direct configuration and power management.

ambient temperature — The temperature of the area or room where the system is located.

ANSI — American National Standards Institute. The primary organization for developing technology standards in the U.S.

asset tag — An individual code assigned to a system, usually by an administrator, for security or tracking purposes.

backup — A copy of a program or data file. As a precaution, back up your system's hard drive(s) on a regular basis.

blade — A module that contains a processor, memory, and a hard drive. The modules are mounted into a chassis that includes power supplies and fans.

BMC — Baseboard management controller.

bootable media — A CD, diskette, or USB memory key that is used to start your system if the system will not boot from the hard drive.

BTU — British thermal unit.

bus — An information pathway between the components of a system. Your system contains an expansion bus that allows the processor to communicate with controllers for the peripheral devices connected to the system. Your system also contains an address bus and a data bus for communications between the processor and RAM.

C — Celsius.

cache — A fast storage area that keeps a copy of data or instructions for quick data retrieval.

cm — Centimeter(s).

COM*n* — The device names for the serial ports on your system.

control panel — The part of the system that contains indicators and controls, such as the power button and power indicator.

controller — A chip or expansion card that controls the transfer of data between the processor and memory or between the processor and a peripheral device.

coprocessor — A chip that relieves the system's processor of specific processing tasks. A math coprocessor, for example, handles numeric processing.

CPU — Central processing unit. See *processor*.

DC — Direct current.

DDR — Double-data rate. A technology in memory modules that potentially doubles the data rate by transferring data on both the rising and falling pulses of a clock cycle.

device driver — A program that allows the operating system or some other program to interface correctly with a peripheral.

DHCP — Dynamic Host Configuration Protocol. A method of automatically assigning an IP address to a client system.

DIMM — Dual in-line memory module. See also *memory module*.

DNS — Domain Name System. A method of translating Internet domain names, such as **www.example.com**, into IP addresses, such as 208.77.188.166.

DRAM — Dynamic random-access memory. A system's RAM is usually made up entirely of DRAM chips.

driver — See *device driver*.

DVD — Digital versatile disc or digital video disc.

ECC — Error checking and correction.

EMI — Electromagnetic interference.

ERA — Embedded remote access. ERA allows you to perform remote, or **out-of-band**, server management on your network server using a remote access controller.

ESD — Electrostatic discharge.

ESM — Embedded server management.

expansion bus — Your system contains an expansion bus that allows the processor to communicate with controllers for peripherals, such as NICs.

expansion card — An add-in card, such as a NIC or SCSI adapter, that plugs into an expansion-card connector on the system board. An expansion card adds some specialized function to the system by providing an interface between the expansion bus and a peripheral.

expansion-card connector — A connector on the system board or riser board for plugging in an expansion card.

F — Fahrenheit.

FAT — File allocation table. The file system structure used by MS-DOS to organize and keep track of file storage. The Microsoft® Windows® operating systems can optionally use a FAT file system structure.

Fibre Channel — A high-speed network interface used primarily with networked storage devices.

flash memory — A type of electronic chip that can be programmed and reprogrammed using a software utility.

FSB — Front-side bus. The FSB is the data path and physical interface between the processor and the main memory (RAM).

FTP — File transfer protocol.

g — Gram(s).

G — Gravities.

Gb — Gigabit(s); 1024 megabits or 1,073,741,824 bits.

GB — Gigabyte(s); 1024 megabytes or 1,073,741,824 bytes. However, when referring to hard-drive capacity, the term is usually rounded to 1,000,000,000 bytes.

graphics mode — A video mode that can be defined as *x* horizontal by *y* vertical pixels by *z* colors.

host adapter — A controller that implements communication between the system's bus and the peripheral device, typically a storage device.

hot-plug — The ability to insert or install a device, typically a hard drive or an internal cooling fan, into the host system while the system is powered on and running.

Hz — Hertz.

I/O — Input/output. A keyboard is an input device, and a monitor is an output device. In general, I/O activity can be differentiated from computational activity.

IDE — Integrated drive electronics. A standard interface between the system board and storage devices.

iDRAC — Internet Dell Remote Access Controller. A remote access controller that uses the Internet SCSI protocol.

IP — Internet Protocol.

IPMB — Intelligent Platform Management Bus. An interconnect between different boards within a chassis.

IPv6 — Internet Protocol version 6.

IPX — Internet package exchange.

IRQ — Interrupt request. A signal that data is about to be sent to or received by a peripheral device travels by an IRQ line to the processor. Each peripheral connection must be assigned an IRQ number. Two devices can share the same IRQ assignment, but you cannot operate both devices simultaneously.

iSCSI — Internet SCSI (see *SCSI*). A protocol that enables SCSI device communication across a network or the Internet.

jumper — Small blocks on a circuit board with two or more pins emerging from them.

Plastic plugs containing a wire fit down over the pins. The wire connects the pins and creates a circuit, providing a simple and reversible method of changing the circuitry in a board.

K — Kilo-; 1000.

Kb — Kilobit(s); 1024 bits.

KB — Kilobyte(s); 1024 bytes.

Kbps — Kilobit(s) per second.

KBps — Kilobyte(s) per second.

kg — Kilogram(s); 1000 grams.

kHz — Kilohertz.

KVM — Keyboard/video/mouse. KVM refers to a switch that allows selection of the system from which the video is displayed and for which the keyboard and mouse are used.

LAN — Local area network. A LAN is usually confined to the same building or a few nearby buildings, with all equipment linked by wiring dedicated specifically to the LAN.

LCD — Liquid crystal display.

LED — Light-emitting diode. An electronic device that lights up when a current is passed through it.

LGA — Land grid array.

local bus — On a system with local-bus expansion capability, certain peripheral devices (such as the video adapter circuitry) can be designed to run much faster than they would with a traditional expansion bus. See also *bus*.

LOM — LAN on motherboard.

LVD — Low voltage differential.

m — Meter(s).

mA — Milliampere(s).

MAC address — Media Access Control address. Your system's unique hardware number on a network.

mAh — Milliampere-hour(s).

Mb — Megabit(s); 1,048,576 bits.

MB — Megabyte(s); 1,048,576 bytes. However, when referring to hard-drive capacity, the term is often rounded to mean 1,000,000 bytes.

Mbps — Megabits per second.

MBps — Megabytes per second.

MBR — Master boot record.

memory address — A specific location, usually expressed as a hexadecimal number, in the system's RAM.

memory module — A small circuit board containing DRAM chips that connects to the system board.

memory — An area in your system that stores basic system data. A system can contain several different forms of memory, such as integrated memory (ROM and RAM) and add-in memory modules (DIMMs).

memory key — A portable flash memory storage device integrated with a USB connector.

MHz — Megahertz.

mirroring — A type of data redundancy in which a set of physical drives stores data and one or more sets of additional drives stores duplicate copies of the data. Mirroring functionality is provided by software. See also *striping* and *RAID*.

mm — Millimeter(s).

ms — Millisecond(s).

NAS — Network Attached Storage. NAS is one of the concepts used for implementing shared storage on a network. NAS systems have their own operating systems, integrated hardware, and software that are optimized to serve specific storage needs.

NIC — Network interface controller. A device that is installed or integrated in a system to allow connection to a network.

NMI — Nonmaskable interrupt. A device sends an NMI to signal the processor about hardware errors.

ns — Nanosecond(s).

NVRAM — Nonvolatile random-access memory. Memory that does not lose its contents when you turn off your system. NVRAM is used for maintaining the date, time, and system configuration information.

parity — Redundant information that is associated with a block of data.

parity stripe — In RAID arrays, a striped hard drive containing parity data.

partition — You can divide a hard drive into multiple physical sections called *partitions* with the **fdisk** command. Each partition can contain multiple logical drives. You must format each logical drive with the **format** command.

PCI — Peripheral Component Interconnect. A standard for local-bus implementation.

PDU — Power distribution unit. A power source with multiple power outlets that provides electrical power to servers and storage systems in a rack.

peripheral — An internal or external device, such as a diskette drive or keyboard, connected to a system.

pixel — A single point on a video display. Pixels are arranged in rows and columns to create an image. A video resolution, such as 640 x 480, is expressed as the number of pixels across by the number of pixels up and down.

POST — Power-on self-test. Before the operating system loads when you turn on your system, the POST tests various system components such as RAM and hard drives.

processor — The primary computational chip inside the system that controls the interpretation and execution of arithmetic and logic functions. Software written for one processor must usually be revised to run on another processor. *CPU* is a synonym for processor.

PXE — Preboot eXecution Environment. A way of booting a system via a LAN (without a hard drive or bootable diskette).

RAC — Remote access controller.

RAID — Redundant array of independent disks. A method of providing data redundancy. Some common implementations of RAID include RAID 0, RAID 1, RAID 5, RAID 10, and RAID 50. See also *mirroring* and *striping*.

RAM — Random-access memory. The system's primary temporary storage area for program instructions and data. Any information stored in RAM is lost when you turn off your system.

R-DIMM — A registered DDR3 memory module.

readme file — A text file, usually shipped with software or hardware, that contains information supplementing or updating the product's documentation.

read-only file — A read-only file is one that you are prohibited from editing or deleting.

ROM — Read-only memory. Your system contains some programs essential to its operation in ROM code. A ROM chip retains its contents even after you turn off your system. Examples of code in ROM include the program that initiates your system's boot routine and the POST.

ROMB — RAID on motherboard.

SAN — Storage Area Network. A network architecture that enables remote network-attached storage devices to appear to a server to be locally attached.

SAS — Serial-attached SCSI.

SATA — Serial Advanced Technology Attachment. A standard interface between the system board and storage devices.

SCSI — Small computer system interface. An I/O bus interface with faster data transmission rates than standard ports.

SD card — Secure digital flash memory card.

SDRAM — Synchronous dynamic random-access memory.

sec — Second(s).

serial port — A legacy I/O port with a 9-pin connector that transfers data one bit at a time and is most often used to connect a modem to the system.

service tag — A bar code label on the system used to identify it when you call Dell for technical support.

SMART — Self-Monitoring Analysis and Reporting Technology. Allows hard drives to report errors and failures to the system BIOS and then display an error message on the screen.

SMP — Symmetric multiprocessing. Used to describe a system that has two or more processors connected via a high-bandwidth link and managed by an operating system, where each processor has equal access to I/O devices.

SNMP — Simple Network Management Protocol. A standard interface that allows a network manager to remotely monitor and manage workstations.

striping — Disk striping writes data across three or more disks in an array, but only uses a portion of the space on each disk. The amount of space used by a **stripe** is the same on each disk used. A virtual disk may use several stripes on the same set of disks in an array. See also *guarding*, *mirroring*, and *RAID*.

SVGA — Super video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

system board — As the main circuit board, the system board usually contains most of your system's integral components, such as the processor(s), RAM, controllers for peripherals, and various ROM chips.

system configuration information — Data stored in memory that tells a system what hardware is installed and how the system should be configured for operation.

system memory — See *RAM*.

System Setup program — A BIOS-based program that allows you to configure your system's hardware and customize the system's operation by setting features such as password protection. Because the System Setup program is stored in NVRAM, any settings remain in effect until you change them again.

TCP/IP — Transmission Control Protocol/Internet Protocol.

termination — Some devices (such as the last device at each end of a SCSI cable) must be terminated to prevent reflections and spurious signals in the cable. When such devices are connected in a series, you may need to enable or disable the termination on these devices by changing jumper or switch settings on the devices or by changing settings in the configuration software for the devices.

TOE — TCP/IP offload engine.

U-DIMM — An unregistered (unbuffered) DDR3 memory module.

uplink port — A port on a network hub or switch used to connect to other hubs or switches without requiring a crossover cable.

UPS — Uninterruptible power supply. A battery-powered unit that automatically supplies power to your system in the event of an electrical failure.

USB — Universal Serial Bus. A USB connector provides a single connection point for multiple USB-compliant devices, such as mice and keyboards. USB devices can be connected and disconnected while the system is running.

USB memory key — See *memory key*.

utility — A program used to manage system resources—memory, disk drives, or printers, for example.

V — Volt(s).

VAC — Volt(s) alternating current.

VDC — Volt(s) direct current.

VGA — Video graphics array. VGA and SVGA are video standards for video adapters with greater resolution and color display capabilities than previous standards.

video adapter — The logical circuitry that provides (in combination with the monitor) your system's video capabilities. A video adapter may be integrated into the system board or may be an expansion card that plugs into an expansion slot.

video memory — Most VGA and SVGA video adapters include memory chips in addition to your system's RAM. The amount of video memory installed primarily influences the number of colors that a program can display (with the appropriate video drivers and monitor capabilities).

video resolution — Video resolution (800 x 600, for example) is expressed as the number of pixels across by the number of pixels up and down. To display a program at a specific graphics resolution, you must install the appropriate video drivers and your monitor must support the resolution.

virtualization — The ability via software to share the resources of a single computer across multiple environments. A single physical system may appear to the user as multiple virtual systems able to host multiple operating systems.

W — Watt(s).

WH — Watt-hour(s).

XML — Extensible Markup Language. XML is a way to create common information formats and to share both the format and the data on the World Wide Web, intranets, and elsewhere.

ZIF — Zero insertion force.

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